GAS JOURNAL

LIGHT HEAT POWER BYE-PRODUCTS

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Editorial Notes.

What's in a Name?

THAT an implied negative lurks in the old question was confirmed last Thursday at the Annual Meeting of the North British Association of Gas Managers; but for a long time, as point and counterpoint were made in argument, it seemed that the answer must be "a great deal." And, certainly for the few Englishmen present, it was fortunate that the matter took a contentious turn, for the debate revealed to the full the courage and tenacity of the Scottish temperament.

Unfortunately, considerations of space (to which we again referred in our editorial columns last week) prevent our reporting all the speakers in full; but from the printed matter will appear the various opinions which diverged from the President's motion to change the name of the North British Association of Gas Managers to "The Institution of Gas Engineers of Scotland." On the one hand we found the term "North British" stigmatized as parochial—an unworthy label for a great national organization—and "Gas Managers" as describing the less important duties of a great branch of engineering. On the other hand, it was clear that many consciences would not square with the appropriation, even in extended form, of a title now writ large at the head of a Royal Charter, and that sympathetic consideration should be had for those who are primarily "Managers" and for the many "Extraordinary" Members of the Association who are neither Gas Engineers nor Gas Managers in the generally accepted meanings of the terms. Between these wings of the debate were many who, by no means apathetic, were yet content that the old order should not change.

Called upon to speak at a critical point in the debate, Mr. Shapley enlisted our sympathy; his position was delicate, and wisely he refrained from official pronouncement without having had an opportunity of conferring with his Council. He is, however, personally inclined to the view that the term "Institution" would be unfortunate. After all, the corporate body of which he is President is now more than ever "The Institution" to gas men far and near; and Mr. Shapley certainly had in mind the fact that the Institution of Public Lighting Engineers (of which he was President in 1925) before registration changed its title to "Association" in deference to the wishes of the Board of Trade. For ourselves, we should have conceived no objection to the term "Institution," provided the words "of Gas Engineers" did not follow in juxtaposition; and we were surprised that no mover of an amendment suggested "Scottish Gas Association"—or "Gas Association of Scotland," to accord more closely with his President's desire. Such titles would have met both wings of "the House," and would have possessed the admirable attribute of brevity. However, in the upshot the "centre" prevailed, and the old name stands. Possibly in any case the Association would still have been known from China to Peru, as heretofore, as the "N.B."

Prejudice and the March of Progress.

THE following is a quotation from a paper on town gas supply from coke ovens which Mr. J. K. Dickie read before the North British Association of Gas Managers last Thursday: "It is not the intention of the coking indus-"try to take the business of gas supply into their own "hands, but rather to co-ordinate the work of the two "industries for their common weal, and to provide a "gaseous fuel which can be offered at cheaper rates to "the public." It is reassuring to know that the coke oven industry has these happy aspirations. Mr. Dickie seems to imply in his contribution, however, that the gas industry is holding-up a development which cannot fail to be beneficial to the gas consumer. This is not true. The industry's one aim is to supply efficient service as cheaply as possible; it is open to take every step likely to bring this aim to fruition, and if certain criticisms of the overtures of the coke oven industry are made, it is not because of perturbation, but because the proposed plans may not benefit the gas consumer.

The gas industry has a name for conservatism, but it is fair to say that no industry in Great Britain has since the war shown such avidity to adopt new improved processes, such freedom from established tradition when this has been found wanting, such a keen desire to put rapidly and effectively into practice its avowed aim of development from within. It has waited neither for external aid nor for a wave of popular opinion, political or general; and having forged steadily—perhaps too unobtrusively—ahead, there is no reason why it should be asked to bear the burdens of other industrial organizations, if the shouldering of these burdens is not in the best interests of its consumers. As a national industry, it is alive to national questions, and would not in the least be likely to bar any development of the coking, the coal, and the iron and steel industries, if only for the commercial reason that prosperity in these basic industries must necessarily reflect favourably on its own advancement. It is, in fact, time that the idea that the gas industry is a dog in the manger was wiped out once and for all.

The crux of the whole matter—aside from considerations of reliability of supply and constancy of quality, which, we think, are in themselves no longer obstacles of first moment—is the price at which coke oven gas can be pumped into the gas undertakings storage plant; and this is where hasty conclusions prove very misleading. In "The Times" a week ago to-day there was an article on surplus gas and electricity, in which the writer lays upon the gas industry the blame of gas wastage at pithead bye-product plants. He says that the majority of the gas distributing undertakings refuse to consider the purchase of coke oven gas in the South Yorkshire area. Actually, they may at present refuse to purchase it; they certainly do not refuse to consider the question.

Mr. Dickie produces some interesting figures; and in view of the gas-works cost of gas into the holder, which

(he quotes for a number of important municipal undertakings) averages 16d. per 1000 c.ft., he states that it is difficult to understand why offers of 6d. to 7d. per 1000 c.ft. should be made for coke oven gas by gas authorities. Many people find this difficult to understand. Purposely we said that reliability of supply was not in itself an obstacle of first moment; but it has to be taken into consideration. It affects this country far more than it does Germany, and it has the monetary effect of depreciating by almost one-half the price which gas undertakings might otherwise offer the coke oven gas suppliers. It has to be remembered, too, that up to the present those undertakings which have been in a position to take coke oven gas are situated in the very areas where cheap coal is available, and consequently where the net gas-works cost of gas into holder is very low. A gas grid such as that under consideration at the moment by the Area Gas Supply Committee might modify the situation favourably from the point of view of the coke oven gas suppliers, in that small undertakings more or less remote from the pithead would be able to be supplied with gas at a cost lower than they themselves can at present manufacture it. At the same time it has to be borne in mind that what would favour the coke ovens in this respect would have a similar effect on the large gas-works, which would be equally able to pump gas into the grid. It would appear, as Mr. Thomas Hardie said recently, that from the broad point of view gas plant with equal priced coals can, owing to its flexibility of operation, make gas more cheaply than can coke oven concerns which are to a certain extent hampered by the primary importance of their main product—which is coke, not gas. It might well be, however, that, by a combination of gas-works and coking plants in well-defined and suitable areas, the gas-consuming public could be supplied with a cheaper commodity. This is the real question; and it must be approached in a spirit of co-operation. Prejudice on either side can retard—it will not arrest—the march of progress; but it is idle to suppose that prejudice exists only on one side.

A Great Trust.

THE Public Lighting Engineer has a big duty thrust upon him, as will be made evident by perusal of the proceedings of the Association devoted to his interests, whose annual meeting took place last week in Bournemouth. To quote the words of Mr. S. B. Langlands (the President), in bringing the business to a close, "the Council have the care of all people under their consideration;" and this applies to each individual member of the Association. It should perhaps be explained that Mr. Langlands' remark was called forth by the following exhortation from one of the delegates: "Do not trouble about "the motorists, but look after the poor pedestrians, and "the Council will be doing good work."

It is, of course, the fact that no interest must be overlooked; but, at the same time, we must confess to a feeling of keen sympathy with the appeal on behalf of those who are compelled to move about on foot. The motorist enjoys many advantages; while those of the pedestrian appear to be few. It seems hard to get the motorist convicted of his faults, and still harder to obtain adequate penalties; whereas opportunity is readily taken to lay blame for accidents upon the unfortunate pedestrian, who is practically always the greater sufferer. How far from the truth would it be if the word "pedestrian" was substituted for "poor" in the following statement, which the writer saw chalked upon a wall during a recent visit to Ireland: "The poor have no "rights, and but few friends?" However, the ground is still used for walking upon, and probably will be, more or less, for a good many years to come, so that provision must be made for the safety of the misguided individuals who continue thus to use it. In the minds of those persons, doubtless, the two public officials holding first place (and we put them in their right order) will be the street lighting engineer and the chief constable. Whatever may be the views of motorists, adequate street lighting is essential to the safety of the pedestrian; and efficient traffic control is necessary to both. Without these, the position of the foot-walker, and without the latter, at any rate, that of the motorist, must become impossible; and therefore is a great trust reposed in the officials named.

Once, at least, during the meeting it was asserted that public lighting must be subservient to considerations of public health. But is not adequate street lighting a "consideration of public health?" Is not the ever-growing list of road accidents—a list which has attained such proportions that it cannot be contemplated without a shudder—a matter affecting the public health? How far now are the figures of maimed and killed from equalling the totals of any one of the nation's chiefly dreaded diseases? So much is it a question of "public health" that it would be folly to place any other consideration in front of it. Again and again was the declaration heard that "it is all a question of finance." That is true as regards the extent to which the public lighting engineer is able to provide adequate street illumination; but it should not be true as regards the authorities upon whom devolves the duty of providing the lighting. If these authorities are unable to meet the needs of rural areas and arterial roads, then let the responsibility be placed upon broader shoulders; but for goodness sake let us get away from the bonds of finance. It is a great national work which must be undertaken at any cost; and the public lighting engineer is the man who must carry it out. When and where the way is clear for him to do so, he will derive much useful information from the proceedings at the Bournemouth meeting.

Ideas from the Lighting Conference.

MANY interesting questions relating to the illumination of our streets and buildings were discussed last week at Bournemouth. With one exception, all the contributions, including the Presidential Address of Mr. S. B. Langlands, were published in the "JOURNAL" for Sept. 11, the closing day of the meeting; and in later columns of our issue to-day will be found a full report of the proceedings. As we observed last week, the communications were short and concise, but they lost nothing through this; they are full of ideas and suggestions, to a few of which we call attention here. Mr. Langlands says that no public lighting department can afford to be without a well-equipped testing station. In his own city—Glasgow—the lighting laboratory costs money, but is saving every day far more than it costs. All new material, such as burners and mantles, is tested, as also is all equipment which it is thought may have deteriorated in use. It is a plan which will appeal strongly to our readers, for nothing is more disheartening than to see an efficient installation losing in efficiency for want of a little attention periodically. There are many places in this country to-day where gas concerns supply the illuminant to local authorities, but have no further control over the results. Due to lack of maintenance, the lighting is often far from satisfactory; and, of course, the general public blame gas.

Our lamp manufacturers and silica manipulators will doubtless discuss how the suggestion of Mr. C. H. Woodward, that mantle clusters might with advantage be constructed in cone formation, can be put into effect. What Mr. Woodward wants is a cone formation apex downwards, with concentric silica reflecting chimneys to prevent the gaseous products from one tier of mantles interfering with those above it; and he thinks that better light distribution would be obtained if the chimney could be metallized, to increase the specular reflection. Like Mr. Langlands, Mr. Woodward is a great believer in predetermining the value of new materials, and is of opinion that lighting departments would do well to equip themselves with photometers and micro-telescopes, to test both the illuminating power and the robustness of mantles. But he points out that, even granted first-class material, only by close and intelligent study of local conditions—the incidence of traffic, the effect of background and road surfaces, the influence of contrast, and so on—can the best results be obtained. Haphazard methods are of no avail to the modern lighting engineer. He lays particular emphasis on the undesirability of too great a

uniformity in either internal or external illumination. Regarding the former, he deplores the excessive use of ceiling illumination, an opinion which we heartily endorse.

"Lighting and Rating" is the title of a paper by ex-Bailie James MacDougall, of Glasgow, and his remarks are very much to the point. First, all town and city councils should have special departments to deal with public lighting, and these departments should be served by officials specifically appointed for the work. Secondly, it should be recognized that, practically without exception, the cities and towns in Great Britain are "simply playing with the lighting question;" they are unprepared to spend anything approaching what ought to be spent on lighting, and most certainly there ought to be a separate lighting rate. Thirdly, the Elysium of adequate illumination being far distant, the utmost must be done with the money collected; and here the author puts in a plea for cheaper gas for street lighting. Glasgow has long appreciated the value of these principles; and the quality and efficiency of its lighting service is an admirable example of what can be accomplished by determined effort and steady control. Regarding the raising of funds for lighting, there seems no reason why motorists should not contribute to the cost of providing them and their "victims" with the service which their number and speed necessitate. The Road Fund is always looked at with envy; but it seems only right that it should help to bear the cost of lighting. There are many villages and small townships through which run important main roads carrying an enormous amount of night traffic; and it is absurd to call upon the few inhabitants of these villages to provide adequate illumination of the roads in their areas. They simply cannot raise the money, and there is no reason why they should.

Besides cheap and satisfactory gas, the supply of which is naturally the primary aim of our industry, there remains the possibility of improving street lighting by private aid; and this is the subject of a paper by Mr. J. S. Dow, the Hon. Secretary of the Illuminating Engineering Society. Instances are furnished by the "parade lighting" installed in some streets in London, Sheffield, and other cities, maintained partly by a contribution by local merchants. As we have mentioned before in the "JOURNAL," in the United States this plan has been adopted on a much more extensive scale. Occupants of stores and business premises in important thoroughfares have consented to share in the initial cost of the installation, and have responded readily to the argument that better lighting attracts custom and brings trade. This idea, we suggest, might with advantage be encouraged.

We have touched on a few of the interesting suggestions put forward at the conference. There is, however, one other important matter to which we would refer in closing this note, and that is the growth of the Association of Public Lighting Engineers not only in membership—and incidentally in quality of membership—but in the theoretical and practical usefulness of the work it is accomplishing with such obvious enthusiasm. The Association is only six years of age, but the members are certainly justified in forgetting its recent birth in the pride which they are properly entitled to take in contemplation of the work done in this short period.

Chair of Gas Engineering at Sheffield.

We are glad to learn that the Sheffield Gas Company have promised an annual subscription of £250 towards the establishment of a Chair in Gas Engineering at the Applied Science Department of the University of Sheffield.

Underwriting Default.

It has come as a great shock to the more trustful portion of the investing public to find that "underwriting" is no guarantee whatever that the expected proceeds of a share issue will be realized. It seems that people have actually been able to underwrite shares for which it was impossible for them to pay, if called upon to do so. This did not matter so long as the procedure was for the underwriter to pocket the commission, and for the public to take all the shares, and so relieve him of his liability; but when the tide turned, and the underwriter was called upon to fulfil his guarantee, trouble naturally arose in these instances. In the case of some companies, to whom the public subscribed money on the strength of unsound guarantees, the results have been serious. Now, the promotion of companies, and business in their shares, brings profit to certain people, and it is for them to see that proper safeguards are provided. A person who applies for shares on the strength of underwriting agreements which on the face of them guarantee in any circumstances a sufficiency of working capital, is entitled to expect the agreements to be carried out. The trouble now is said to lie with "sub-underwriters;" but the investor is not concerned with this. Often enough he finds himself with few of the trumps in his hand; but he is at least entitled to count upon a "square deal." What if he ceased to lay his golden eggs in the City?

More Statistics.

The collection and study of statistics are not a cure for all industrial and commercial evils, but a valuable means of guiding those in positions of responsibility. These words conclude an article in the Trade Supplement of "The Times," in which the writer, after remarking that one of the causes of our present suffering was the post-War boom in business, when industrialists enlarged their commitments to meet an illusory prosperity, says: The great difficulty in avoiding abnormal conditions is the lack of adequate statistics of production and of accumulated stocks of merchandize. Each industry needs an impartial, centralized statistical bureau, for the collection of regular reports of production, stocks, and consumption of the products of all manufacturers in the industry. Strict secrecy must naturally be observed in regard to the figures of the different companies, a final list being circulated to all the manufacturers showing total production, stocks in all hands, and rate of consumption. These data represent the desirable minimum for the guidance of producers in the industry. In addition, it would be advisable to include statistics of unfilled orders, deliveries, and the proportion of shop capacity fully employed.

Newcastle Bitumen Cable Explosion.

If any doubt still remained as to the cause of the fatal explosion in the Newcastle Cloth Market on Aug. 16 (when two persons received fatal injuries and sixteen others were hurt), it was set at rest by the verdict of the Coroner's Jury, that "death was due to injuries from an explosion of bituminous gas caused by a defective electric cable." The Jury added that there was no evidence to show whether or not the gas ignited spontaneously. After the explosion, investigation showed that the ground round the cable was hot. Tiles were removed, and it was found that, owing to the extremely high temperature, the bitumen had melted and produced a gas containing hydrogen. The gas escaped into a cellar, where the explosion occurred. The bitumen cables are being replaced by a rubber compound cable.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Sept. 18-19.—CERAMIC SOCIETY.—Refractory Materials Section Meeting, Midland Grand Hotel, St. Pancras.

Sept. 19.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council meeting in the afternoon.

Oct. 4.—NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.—Autumn meeting at Middlesbrough.

Oct. 4.—MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.—General meeting.

Oct. 8.—ILLUMINATING ENGINEERING SOCIETY.—Meeting at 15, Savoy Street, W.C. 2, 6.30 p.m.

Oct. 9.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Autumn meeting in the Holborn Restaurant at 2.30 p.m.

Oct. 28-30.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at Eastbourne.

Nov. 20.—SOCIETY OF BRITISH GAS INDUSTRIES.—Autumn General Meeting, Hotel Metropole.

Association of Special Libraries and Information Bureaux.—The annual conference of the Association will be held at Trinity College, Cambridge, during next week-end, commencing on Friday, Sept. 20.

PERSONAL.

Major RICHARD MILES has been appointed to manage the Ironworks Department of Messrs. Newton, Chambers & Co., Ltd., Thorncliffe Collieries, Ironworks and Chemical Works, near Sheffield, in succession to his father, the late Mr. T. V. Miles, Director and General Manager.

The marriage took place at Dorchester, on Sept. 7, of Miss Phyllis Osmond, daughter of Mr. and Mrs. Frank Osmond, of Dorchester, and Mr. Clifford John Horne. Miss Osmond was a member of the clerical staff of the Dorchester Gas Company, of which her father has for a long time been Manager.

Congratulations have been extended to Mr. MAURICE T. SHAW, of the Belfast Gas-Works staff, who recently obtained the Degree of B.Sc. in Engineering of the University of London. During the past nine months Mr. Shaw has been engaged in supervising carbonizing plant at the works. On the recommendation of the Manager, he has now been appointed to the position of Technical Assistant.

OBITUARY.

The death has taken place of Mr. LEONARD HALL, Gas and Water Consulting Engineer to the Rhyl Council.

The death occurred, on Sept. 10, of Mr. JOHN LEIGH, J.P., of West Leigh, near Preston, aged 77, Chairman of the Preston Gas Company for several years.

The death occurred on Tuesday, Sept. 10, after a short illness, at the Hillside Nursing Home, Lidlington, of Mr. RALPH HALKETT, in his 86th year. He was Manager, and later Lessee, of Gas-Works in Oxfordshire and Hertfordshire, and was actively associated for many years with the gas industry, often acting in a consultative capacity. He was elected a member of the British Association of Gas Managers in 1878. Mr. Ralph Halkett, the General Manager and Secretary of the Sheffield Gas Company, is a son, and received his early training under his father. Our readers will join us in our expression of sympathy with Mr. Halkett of Sheffield.

GAS STOCK AND SHARE MARKET.

[For Stock and Share List, see later page.]

LAST week the stock markets, while they still remained somewhat subdued, displayed a more encouraging tendency. This was chiefly reflected in the gilt-edged market, but there was also a renewal of New York activity. Dealers take a more favourable view of the monetary situation, and a confident feeling prevails with regard to future business. War Loan was specially favoured in view of the four months' dividend accrued in the price, and Treasury Bonds were also supported, the latter being slightly the cheaper of the two.

The Gas Market cannot be said to be animated. Although the general depression has not affected this market to the same extent as in others, it is clear that during the past few weeks prices have tended to sag. It is possible that the continued fine weather has not encouraged business in the industry; but inquiries of the various companies indicate that the reduction in gas sales, if any, are unimportant, and every confidence is shown in the results for the year. It will be seen from the Stock and Share List that the movements in values on the week are small, and that there have been improvements in one or two instances, but, excepting *ex div.* reductions and the fall of 2½ in Imperial Continental Capital, there has been no reduction in the quotations in excess of 1¼ p.ct.

The following transactions were recorded during the week:

MONDAY.—Aldershot and District 74, Barnet District 7 p.ct. 112½, Commercial 94½, 95, European 16⅝, 16¾, 17⅛, 17¼, Gas Light and Coke 18s., 18s. 3d., 4 p.ct. cons. pref. 74½, Imperial Continental 437, 438, 439, 441, 442, 443, 444, 445, Oriental 117, Primitiva 4 p.ct. cons. deb. 81½, 82, 4 p.ct. deb. (1911) 82, South Metropolitan 101, 101⅛, 101⅜, 101¾, 102, Uxbridge 5 p.ct. 96, 96½. Supplementary prices, Associated Gas and Elec. "A" $73, Croydon 7½ p.ct. pref. 102¾.

TUESDAY.—Alliance and Dublin 96½, 97½, 98, Gas Light and Coke 17s. 10½d., 18s. 1½d., 18s. 3d., 4 p.ct. pref. 73, 73¼, 3 p.ct. deb. 56⅜, Imperial Continental 432, 435, 437, 438, 439, 439½, 440, Primitiva 34s. 3d., South Metropolitan 101, 101¼, 101⅜, 6 p.ct. pref. 106½, Sutton 118, 118⅛, 5 p.ct. deb. 98, Uxbridge 5 p.ct. 96, 97. Supplementary prices, Associated Gas and Elec. "A" $72, Gravesend and Milton 5 p.ct. std. 70, Horley "B" 7½ p.ct. std. 107.

WEDNESDAY.—Alliance and Dublin 96, 97¼, European 16⅛, Gas Light and Coke 17s. 10½d., 18s., 18s. 1½d., 18s. 3d., 4 p.ct. pref. 74¼, 3 p.ct. deb. 56, 56½, 57¼, Imperial Continental 432, 432½, 437, 440, Primitiva 35s., 4 p.ct. cons. deb. 81½, 82, South Metropolitan 101½, 101⅝, 3 p.ct. deb. 58, South Suburban 5 p.ct. 104, 105. Supplementary prices, Associated Gas and Elec. "A" $69, $71, Lea Bridge 5 p.ct. pref. 81, 82.

THURSDAY.—Alliance and Dublin 94, Bombay 17s. 6d., British Gas Light 118 *ex div.*, 4 p.ct. deb. 73, European 16½ *ex div.*, Gas Light and Coke 17s. 10½d., 18s., 18s. 1½d., 3½ p.ct. 61½, 62, 4 p.ct. pref. 74⅞, 74½, Imperial Continental 430, 432, 435, 437, Oriental 116½, 117, Primitiva 34s. 9d., 34s. 10½d., 35s., 35s. 3d., South Metropolitan 100¾, 101, 101½.

FRIDAY.—Alliance and Dublin 98, European 16, Gas Light and Coke 17s. 10½d., 18s. 1½d., 18s. 3d., 3½ p.ct. 62½, 3 p.ct. deb. 56, 5 p.ct. deb. 99½, Imperial Continental 424, 425, 427, 428, 430, South Metropolitan 6½ p.ct. deb. 98½, Sutton 118½, Tottenham and District 3½ p.ct. 106, Uxbridge 5 p.ct. 96. Supplementary prices, Brighton and Hove 4 p.ct. deb. 73, Warwick 66.

The short loan market was easier in tendency during the whole of last week, and towards the close fresh money was obtainable at as low as 3½ p.ct., old loans being renewed at from 4¼ p.ct. down to 4 p.ct. There was an increased demand for Treasury Bills, the amount applied for being greater than for any week since July 12; but the average rate at which they were allotted was only slightly in excess of the previous week at £5 9s. 8·27d. p.ct.

Movements in the Foreign Exchange Market were insignificant. Sterling on New York closed without change at 4.84¹¹⁄₁₆; Belgas depreciated slightly to 34.87½; German reichsmarks were a little dearer at 20.36½; Italian lire closed at 92.69½; while Spanish pesetas at 32.86, Dutch florins at 12.09⅜, and French francs at 123.90, were unchanged.

Silver was cheaper at 23¹¹⁄₁₆d. per oz., and Gold was unchanged at 84s. 11½d. per oz.

The Bank Rate is 5½ p.ct. to which it was raised from 4½ p.ct. on Feb. 7. The Bank's deposit rate is 3½ p.ct., and the deposit rates of the Discount Houses are 3½ p.ct. at call and 3¾ p.ct. at notice.

NATIONAL GAS COUNCIL.

Meeting of the Central Executive Board.

A Meeting of the Central Executive Board of the National Gas Council took place on Sept. 10 at No. 28, Grosvenor Gardens, S.W.—Sir DAVID MILNE-WATSON in the Chair.

MARKETING OF TAR, CREOSOTE, AND PITCH.

It was reported that a Joint Committee of tar producers in the gas and coke oven industries, and tar distillers, which had been set up to frame a scheme for the pooling, disposal, and sale of tar, creosote, and pitch, was proceeding on satisfactory lines. Negotiations were in progress for the formation of both a creosote pool and a pitch pool upon a permanent basis, and arrangements had been made for the purpose of stabilizing prices for the time being.

AREA GAS SUPPLY COMMITTEE.

It was reported that, in accordance with the decision of the Central Executive Board at their last meeting, a copy of the Preliminary Survey prepared on behalf of the Council had been forwarded to the Area Gas Supply Committee.

STATE-AIDED ELECTRICITY SUPPLY.

Arising out of a specific case brought to the notice of the Council, it was decided to set up a small Committee to consider the position created by the State-subsidizing of schemes for the supply of electricity in rural areas.

CONJOINT CONFERENCE OF PUBLIC UTILITY ASSOCIATIONS.

It was reported that a meeting of the Conjoint Conference of Public Utility Associations had taken place on July 11, when a report was made with regard to the question of mains and cables in highways. It was stated that a Memorandum on this matter had been prepared and forwarded to the constituent Associations of the Conjoint Conference, and also to individual members of the Conference. The water interests had, however, written pointing out that they could not depart from their

previous decision, and would not therefore negotiate with the highway authorities. Both the water interests and other bodies represented on the Conjoint Conference agreed, however, that there would be no objection to the gas and electricity interests negotiating individually with the highway authorities; and negotiations were therefore pending.

RAILWAY WAGONS—CORRECTION.

In the report of the meeting of the Central Executive Board held on July 9 last, it was erroneously stated that the Memorandum forwarded by the Council to the Standing Committee on Mineral Transport expressed the view that there should be two classes of wagon—viz., 20 tons and 12 tons. The final decision of the Central Executive Board was that ultimately 20-ton wagons should be the standard size; and the Memorandum in question contained this recommendation. It was stated at the meeting of the Board on Sept. 10 that a lengthy communication had now been received from the Standing Committee on Mineral Transport, asking for further information with regard to—

(*a*) the cost that would be involved in making the alterations necessary to enable 20-ton standard mineral wagons to be dealt with at gas-works where this cannot already be done;

(*b*) the desirability of gas-works taking more of their coal supplies in train-loads.

It was agreed that the Council should endeavour to collate this information.

RATING APPEAL.

It was reported that the assistance of the Council had been asked by a Gas Company in connection with an appeal which that Company was making to Quarter Sessions against the decision of the Local Assessment Committee, on the ground that a question of principle was involved, in that the Assessment Committee had refused entirely to accept the "profits principle" as the basis of valuation of the undertaking, and had valued the undertaking upon the contractors' principle. The matter had been referred by the Council to a Special Committee dealing with such matters, which had met that morning and had recommended that the Council should render assistance in the way of advising the Company in question, adding that it was unlikely that the case would go to Quarter Sessions. It was agreed to adopt the recommendation of the Committee in question.

RESTRICTIONS ON THE USE OF GAS IN COUNCIL HOUSES.

Members were reminded that this matter had been considered by the Joint Industrial Council for the Gas Industry in March last, when a resolution was passed urging the Minister of Health to prevent local authorities from imposing restrictions upon the tenants of council houses as to their choice in the matter. In view of a recent case where the Corporation was excluding gas from their housing schemes notwithstanding many appeals from the tenants to be supplied with gas, it was decided that a deputation from the Council should seek an interview with the Minister of Health on the matter.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting in St. Andrews.

The Sixty-Eighth Annual General Meeting of the North British Association of Gas Managers was held in the University Buildings, North Street, St. Andrews, on Thursday last. Mr. J. W. Napier, Alloa, the President of the Association, occupied the Chair, and was accompanied to the platform by past and present officials of the Association, Provost W. N. Boase, representing the City of St. Andrews, ex-Provost George Aikman, Chairman of the St. Andrews Gas Company, Mr. C. S. Shapley, President of the Institution of Gas Engineers, and others. The attendance of ordinary and extraordinary members at the outset of the programme for the day was one of the best in the history of the Association.

A CIVIC WELCOME.

The PRESIDENT said they were favoured by the presence of the civic head of the City of St. Andrews—Provost Boase. The gas industry recognized that municipalities played a very important part in the affairs of gas; and they all appreciated the recognition which the Council of St. Andrews accorded them. They felt that in a city of such tradition and importance in the affairs of the world as St. Andrews they were not only honouring that city, but they were being honoured by it. This was a university city; and they, belonging to a scientific and technical association, considered it fitting that they should come to St. Andrews and be welcomed not only by the civic head of the city, Provost Boase, but by ex-Provost George Aikman, who had been the Chairman of the St. Andrews Gas Company for many years. If his memory served him right, ex-Provost Aikman was present on the last occasion when the Association met in St. Andrews.

Provost W. N. BOASE said it gave him very great pleasure to offer the members a formal, but none the less cordial, welcome to the City of St. Andrews. The Town Council whom he represented felt glad and proud that the Association had elected to hold their annual conference there. They sincerely hoped that the members would enjoy their stay in the city, and that the conference would be in every way a great success.

The PRESIDENT expressed the gratitude of the members of the Association for the cordiality of the reception given by the Town Council. They hoped to have the pleasure at a later stage of the proceedings of partaking of the hospitality of the Civic Fathers.

Ex-Provost GEORGE AIKMAN said that as Chairman of the local Gas Company he would like on behalf of his co-Directors and himself to be associated with the kindly welcome which had been given by the Town Council of St. Andrews. He was very glad indeed that the Association had elected to hold their annual meeting in St. Andrews, because, frankly, he did not think they could have chosen a better place. The natural beauty of the surroundings, the historical reminiscences associated with the district, and the academic atmosphere which was present all combined to create a city which was difficult to equal. He felt sure that the short visit the members were paying to St. Andrews at this time would be enjoyed to the full by everyone.

The PRESIDENT, acknowledging the welcome, said he realized, in glancing over the records, that the St. Andrews Company had played no small part in the development of the industry and the city. He had pleasure in recalling the fact that Sir Hugh Lyon Playfair was a Director of the St. Andrews Gas Company, and he undoubtedly did much to bring the city into fame. That name was one to conjure with; and it must be a matter of interesting tradition and value to the local Gas Company that such an honoured name should appear in the list of Directors.

Provost Boase and ex-Provost Aikman at this point withdrew; and the ordinary business of the meeting was taken.

THE LATE MR. ALEXANDER WILSON.

The PRESIDENT said the annual report and financial statement had already been circulated, and he presumed these would be taken by the members as read. He desired, however, to take the opportunity of paying a tribute to the memory of Mr. Alexander Wilson, at one time Chief Gas Engineer to the City of Glasgow, President of the Institution of Gas Engineers, and one of the Past-Presidents of their own Association. His name would go down in the records of Scottish gas affairs as one who did much by his personal work and by his zeal and interest to forward the interests of gas manufacture. His personality was winning and attractive. He was particularly anxious and solicitous for the welfare of the youth of the industry. There was no question that the late Mr. Wilson's interest in that department was one of striking value. It certainly had been instrumental in paving the way for considerable benefits for the younger men of the industry to-day.

EDUCATION.

The finances of the Association were particularly healthy. It was likewise pleasing to observe that the Benevolent Fund was in a happy position. Then with regard to education they would observe that as the gas industry in Scotland they were to be congratulated on subscribing an annual sum of about £300. That money was allocated among the technical colleges in Glasgow, Edinburgh, and Dundee. During the past year considerable attention had been given to the position of the isolated gas student. In Scotland it was felt that something required to be done on behalf of that type of student. It was pleasing to note that the endeavours of the Association to bring about certain concessions to these students by reason of the geographical position they were in had met with success. The handicap under which they had previously suffered had now been removed. They were now substantially in the same position as those better situated geographically as regards ancillary subjects. The President concluded by formally moving the adoption of the report.

Mr. GEORGE BRAIDWOOD, Coatbridge, seconded the motion, which was agreed to unanimously.

NEW MEMBERS.

The SECRETARY (Mr. Archd. Kellock, Airdrie) submitted the following supplementary list of new members:

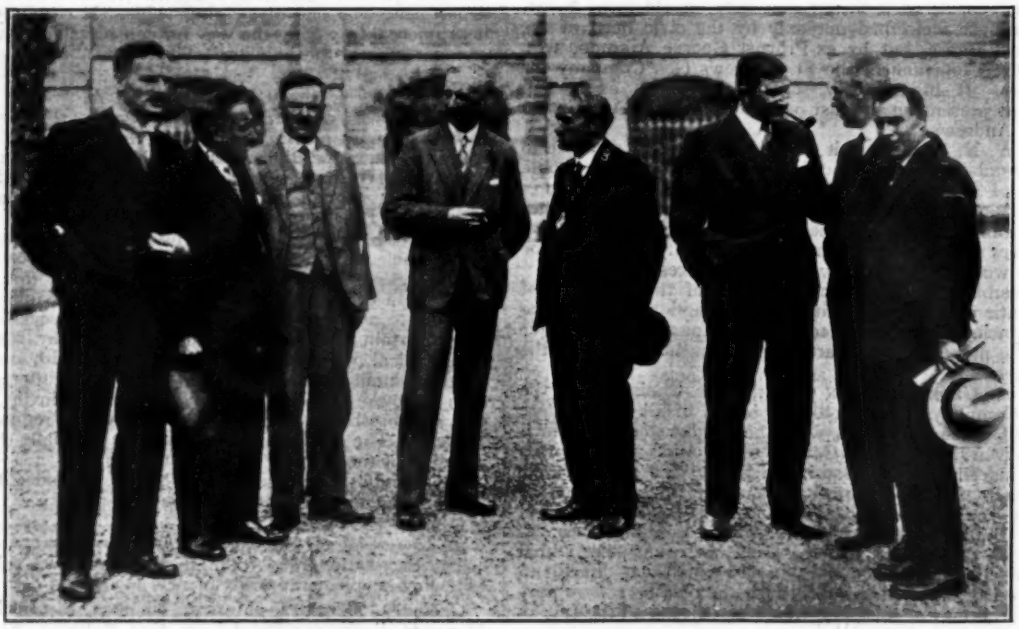
Ordinary Members.—Messrs. Thomas S. Lockhart, Gas Manager, Rothesay; Peter Low, Gas Manager, Elgin; W. E. Readdie, Gas Manager, Anstruther; Charles E. Smith, Assistant Gas Manager, Aberdeen; M. A. Waddell, Gas Manager,

Laurencekirk. *Extraordinary Members.*—Mr. E. B. Tully, Director of Messrs. Tully, Sons, & Co., Ltd., Newark-on-Trent; Mr. F. Tudsbury, Managing Director of the Scottish Tar Distillers, Ltd., Falkirk.

THE TITLE OF THE ASSOCIATION.

The PRESIDENT said he proposed at this stage to submit formally the motion standing in his name—"That the Association in future be called 'The Institution of Gas Engineers of Scotland' and that Rule I. be rescinded to this effect." Mr. Napier said that the name by which an Association of professional men was designated was of some value and importance. It was of value in so far that it exhibited the status and learning of the individual. To his mind it was of importance also, in so far that the industry concerned should be represented by men of scientific and technical understanding. The gas industry within the past ten years had reached a high standard of national work, and as a public utility service its duty was of paramount importance. But, above all, gas administration to-day was a technical position which reached a higher standard of man. He felt that what was true of the immediate past years would be more so in the future of the profession. There had come into the business of gas manufacture and gas supply institutions of great importance and influence. He might say that the National Gas Council was the Parliament of the industry, while the British Commercial Gas Association was the powerful factor on the commercial side. Most important of all, so far as personnel was concerned, was the high standard of qualification for entrance to the profession that was demanded by the Education Scheme of the Institution of Gas Engineers. The North British Association was national as regards Scotland, and a national title was required. The words "North British," it seemed to him, had a parochial meaning—indeed, no meaning whatsoever, for the reason that North Britain was an unknown phrase. As a matter of fact, it was a name that had fallen into complete desuetude. All of them, he felt, were professional men representing the gas industry in Scotland. They were Scottish by birth, by tradition and character; and they ought to be Scottish by name. Whoever heard a Scotsman termed a North Britisher? As regards the words "gas engineer" being substituted for those of "gas manager," surely no objection whatever could be offered. As he looked at it, it evidenced the higher value of the profession. The premier gas association of Great Britain—in that connection he would refer to the Institution of Gas Engineers—embodied the term "engineer" only. They were engineers first and last, and the term manager was simply departmental. It signified, as he viewed it, only a part of their qualifications and duties.

Mr. DAVID VASS, Perth, said he had much pleasure in second-



LEFT to RIGHT: Messrs. T. W. Harper (Ayr), James Bell (Dumbarton), Archibald Kellock (Airdrie—Secretary), H. G. Ritchie (Falkirk), J. W. Napier (Alloa—President), C. S. Shapley (President of the Institution of Gas Engineers), David Fulton (Helensburgh—President-Elect), and R. M. Simpson (Denny).

THE YOUNGER GRADUATION HALL OF THE UNIVERSITY OF ST. ANDREWS, IN WHICH MR. AND MRS. NAPIER ENTERTAINED SOME 280 GUESTS AT LUNCHEON.

ing the resolution, for the reason that the new title was suggestive of a more united front.

Mr. R. M. SIMPSON, Denny, regretted he could not support the motion. The status of the gas industry had recently been increased by the gaining of a Charter. That Charter was now something that belonged to that Institution, and those who were members of that body were entitled to be termed "gas engineers" by virtue of that Charter. If the Association adopted the title suggested, then there was a great proportion of members who could not be included within the category of "gas engineers." The inference was made by the President that the introduction of the words "of Scotland" would overcome any possible difficulty. That was the very point on which he found himself in direct disagreement with the President. If Mr. Napier's motion was carried in its present form, he (Mr. Simpson) did not think the Association would be improving its position in Scotland. The by-laws of the Institution of Gas Engineers made it clear that its members possessed the privilege of using certain letters by way of defining their qualifications. It really amounted to this—that members of the Association under whose auspices they were meeting could by the introduction of the words "of Scotland" appropriate to themselves the use of the same initials. If that was to be privileged in Scotland, then it ought to be made equally applicable to their Irish and Welsh colleagues. In the event of that sort of thing, then the Charter for which the Institution of Gas Engineers had fought so strenuously became of really no value whatever. Surely the members of the profession in Scotland appreciated and recognized the fact that higher prestige had been conferred upon the gas industry by the granting of the Charter. Personally he had no rigid objection to the title; his chief complaint was that Mr. Napier in his motion was nationalizing the title so far as Scotland was concerned. As an amendment, therefore, he was prepared to move that the Association should for the future be termed "The Scottish Institution of Gas Engineers and Managers."

Mr. H. G. RITCHIE (Falkirk) seconded the amendment. He pointed out that 50 p.ct. of the members of the Association were not members of the Institution of Gas Engineers. Now that the Institution had got the Charter, he did not think the members of the Association under whose auspices they were meeting should adopt the title embodied within the resolution of the President. What was suggested by Mr. Simpson gave them all that was required.

Mr. GEORGE BRAIDWOOD (Coatbridge) spoke in support of the President's motion, while Mr. JOHN FRAZER (Dalmarnock) thought the proposed title ought not to be adopted unless the members of the Association were prepared to undergo the same test as that applied to members of the Institution of Gas Engineers. This implicated the extraordinary members of the North British Association. He therefore supported the amendment.

Mr. JOHN WILSON (Motherwell) thought the title "Scottish Association of Gas Managers" would go far towards meeting the views of those in two minds. The Institution of Gas Engineers had just emerged from an arduous fight for a Charter; and at the present stage he felt it would be a misfortune to do anything that might belittle the achievement.

The PRESIDENT, having further argued his point, stated that he was willing to put forward as title "The Institution of Gas Engineers and Managers of Scotland;" and Mr. SIMPSON and Mr. RITCHIE indicated that they were prepared in that case to withdraw the amendment. Mr. Napier then invited Mr. C. S. Shapley to speak.

The President's Memento, which has been beautifully refashioned.
The plaque of Murdoch is of silver, and is carried in a finely wrought bronze frame suitable for table or for hanging.

Mr. C. S. SHAPLEY, President of the Institution of Gas Engineers, said that when he came to the meeting he was not

PRODUCT OF AN UNOFFICIAL LENS.

aware that such a motion as that proposed by the President was on the agenda. As President of the Institution he had made it a matter of policy never to speak on any debateable or contentious point without first consulting the members of his Council. Of course he had his own personal view on the resolution before the meeting; but he considered it would be unwise to make any definite statement with regard to it. If he might, however, be allowed to make one remark, it was this—that the use of the word "Institution" was rather unfortunate.

The discussion was brought to a close by the raising of the question whether the members should not first vote in favour of a change of title.

Mr. R. W. COWIE (Hawick) thereupon moved that the name remain as before; and the carrying of his motion by a large majority closed the incident.

THE METHOD OF VOTING.

Mr. DAVID FULTON said that, with a view to giving all qualified members an opportunity of voting on the appointment of office-bearers, whether they were present at the annual general meeting or not, he was prepared to move that ballot papers should be transmitted by post. He suggested that the time had arrived when drastic steps should be taken to stimulate among the members a greater interest in the election of officials. For some years the number of members voting at the annual general meetings had varied considerably. The lowest was possibly about 50, while the highest figure was round about 80. Even taking the higher figure, it represented far too low a proportion of the membership, which was approximately 180. The feeling was that if every member of the Association was given a voting paper at least a fortnight prior to the annual general meeting he could have an opportunity of calmly considering for whom he was going to vote.

The resolution having been duly seconded,

Mr. JOHN WILSON (Motherwell) remarked that the Council ought to concentrate on making the arrangements clearer, so as to minimize invalid and spoiled ballot papers.

Mr. GEORGE BRUCE (St. Andrews) said that, to his mind, what Mr. Fulton had proposed was tantamount to going back to the old days of corruption. The right way of electing officials was by the ballot box.

Mr. GEORGE KEILLOR (Greenock) said that the method which was in vogue to-day, and which Mr. Fulton sought to change, was ultimately agreed to after very considerable thought. What Mr. Fulton proposed was the reversion to a system of twenty or thirty years ago which many of them deplored.

Mr. FULTON said he had tabled the proposal merely because during his term of office as Secretary many members complained to him that they had been prevented from exercising their votes in an election in which they were keenly interested, because of an inability to attend the annual meetings.

Following some further discussion a vote was taken with the following result: For Mr. Fulton's motion 36; against 30.

The PRESIDENT said that, as the change contemplated required a two-thirds majority, the motion must fall.

PRESENTATION OF CERTIFICATES.

The PRESIDENT, at this stage of the proceedings, presented the certificates of the Institution to the successful Scottish

students. In doing so Mr. Napier remarked that the young men of the gas industry in Scotland were to be congratulated on their excellent work. It was most gratifying to the senior members of the industry to find that so many of the younger men had gained certificates.

The successful students, the majority of whom were present to receive their certificates, were as follows:

Higher Grade Engineering.—1st Class: Sam McGown (Dalmarnock) and Alexander Ivan (Helensburgh); and Class: T. M. Duncan (Perth) and W. S. Johnstone (Dundee).

Ordinary Grade.—Engineering and Supply: James Storrier, F. R. Mitchell, W. G. Heggie, J. M. Dow, and John Duffy (all of Dundee); Supply only: Wm. Neilson.

THE UNIVERSITY LABORATORIES.

The PRESIDENT announced that the Chemical Laboratories of the University of St. Andrews were famous for their research, and Prof. Read had arranged a visit for all the members of the Association who were interested.

REPORT OF SCRUTINEERS.

The report of the scrutineers disclosed the result of the election of new office-bearers as follows:

President.—Mr. David Fulton, Helensburgh.
Senior Vice-President.—Mr. H. G. Ritchie, Falkirk.
Junior Vice-President.—Mr. T. W. Harper, Ayr.
Members of Council.—Messrs. George Bruce, St. Andrews, and George Braidwood, Coatbridge (both for three years); Robert M. Simpson, Denny (two years).

Mr. DAVID FULTON briefly returned thanks for the honour conferred upon him.

PRESENTATION TO THE PRESIDENT.

Mr. H. H. GRACIE (Edinburgh) presented the President with the usual memento of his year of office; and
Mr. NAPIER acknowledged the gift.

VOTES OF THANKS.

Mr. W. B. M'LUSKY, the President of the Manchester District Institution of Gas Engineers and Managers, followed with a vote of thanks to the President, the readers of the papers, the University of St. Andrews, the Town Council, and the St. Andrews Gas Company.

THE LUNCHEON.

On Thursday the members and friends of the Association were the guests of the President and Mrs. Napier at a luncheon which was held in the Younger Graduation Hall.

After the Loyal Toast,

Mr. W. M. MASON, Manager of the British Commercial Gas Association, proposed the toast of "The City and University of St. Andrews," coupled with the names of Provost W. M. Boase and Prof. Read, of the Chemistry Department of the University.

Provost BOASE, in his acknowledgment, observed that an interval of twenty-five years had elapsed since the North British Association honoured St. Andrews with a visit. In that connection the point just occurred to him that if twenty-five years hence they returned to the city of St. Andrews he (the Provost) would just be the age that ex-Provost Aikman was at the moment. He noticed during the dinner, and in the earlier proceedings of the ordinary meeting, that the President required to have recourse to a 6½d. hammer for the enforcement of order and the rules of debate and procedure.

Prof. READ remarked this was the second occasion on which the Younger Graduation Hall had been used since its formal opening, and it was the first time the building had been used for a non-academic function. It was of importance that the University of St. Andrews should be recognized as being particularly interested in chemistry, which subject, he said, owed a great deal to the pioneers of the gas industry.

Ex-Provost ANDREW AIKMAN, Chairman of the St. Andrews Gas Light Company, Ltd., proposed the toast of "The Gas Industry." He observed that the development of the industry, particularly in the present century, had been nothing short of remarkable; and it was significant that to-day the manufacture of gas was closely associated with almost every other industry. Gas was used in practically all trades.

Mr. C. S. SHAPLEY, the President of the Institution of Gas Engineers, with whose name the toast was coupled, briefly replied.

Miss FRANCES WARROCK, M.B.E., of St. Andrews, proposed the toast of "The Chairman;" and Mr. NAPIER replied.

SOCIAL EVENTS.

In delightful weather a series of social functions was carried out on Wednesday under the auspices of the Association. Mr. Bailie George Bruce, Gas Manager at St. Andrews, had charge of the ladies' golf competition on the Old Course of the grey city, while Mr. James O. Scott, of the New Grange Meter Works, Edinburgh, was the Convener of the men's golf handicap played over the Eden Course. Mr. C. F. Dunlop, of 15, Gordon Street, Glasgow, was, as in previous years, the Secretary of the bowling competition. This was decided on the green of the St. Andrews Bowling Club, the use of which was kindly granted for the occasion.

In a ladies' putting competition the first prize was won by Mrs. Keillor, of Greenock; the second by Miss Wilson, of Glasgow; and the third by Mrs. George Bruce, of St. Andrews. Mrs. Napier kindly entertained the players to tea and presented the prizes.

Sixty-three players took part in a competition over the Eden Course. The challenge bowl and memento were tied for by Mr. R. L. Laing, Brechin (78−6 = 72), and Mr. Robert Cairns, Glasgow (85−13 = 72). On the replay Mr. Cairns was the winner. The best scratch score was returned by Mr. R. L. Laing, with 78. Other handicap winners were: Section I.—Mr. W. B. Hudson, Manchester; Mr. A. Cuthbert, Grangemouth; and Mr. P. M. Cim, Buckie. Section II.—Mr. R. B. Glover, Bramhall; Mr. J. Wilson, Motherwell; Mr. D. D. Bruce, Thurso; and Mr. R. W. Broadhead, Ashton-on-Mersey.

In connection with the bowling competition the winners of the trophy were—Messrs. A. Robertson, Annan; A. D. Coubrough, Alyth; R. J. Philp, North Berwick; A. Craig, Kilwinning.

In the ladies' golf competition, played over the Old Course on Wednesday afternoon, the prizewinners were Miss Morton (a Yorkshire County player) with a gross score of 96; Mrs. George Keillor, 84 net; and Mrs. R. D. Glover, 85 net.

On Thursday evening the Provost, Magistrates, and Councillors of the Royal Burgh of St. Andrews and the Directors of the Gas Company entertained the Association and many guests in the Town Hall. The reception was followed by a delightful vocal and instrumental concert, and this by dancing which continued with enthusiasm till the small hours of Friday. In the course of the evening Mr. David Fulton, the President-Elect, proposed a hearty vote of thanks to the hosts, and to Councillor Miss Warrock, M.B.E., who was largely responsible for the arrangements.

On Friday morning visits were paid to many of the buildings of antiquarian or historical interest for which St. Andrews is famed.

SIMPLIFIED IODINE PENTOXIDE APPARATUS FOR DETERMINATION OF CARBON MONOXIDE IN FLUE GAS.[1]

By F. E. VANDAVEER and R. C. GREGG, American Gas Association Testing Laboratory, Cleveland, Ohio.

Paper before the Division of Gas and Fuel Chemistry of the American Chemical Society.

(*Concluded from p.* 555.)

PREPARATION AND STANDARDIZATION OF SOLUTION.

Potassium Iodide Solution.—A solution of 10 p.ct. by weight potassium iodide and 90 p.ct. by weight distilled water is used. This solution should be kept in a dark place. With proper care it will remain satisfactory for use for several weeks, but if allowed to stand in the sunlight it will slowly decompose, so that an indication of iodine will be found with starch indicator. The fresh solution should show no trace of free iodine.

Starch Indicator.—Potato starch has been found to be the most sensitive indicator for iodine. It is sensitive to two drops of 0.001*N* iodine in 20 cc. of solution, whereas wheat starch and soluble starch are sensitive only to three drops. To prepare the solution, dissolve 2 or 3 grammes of starch in a few centimetres of cold water and add to 200 cc. of boiling distilled water. Continue to boil for 2 or 3 min., then cool to room temperature. This solution should be made fresh every day; otherwise a distinct change from blue to white will not be obtained when titrating the iodine. Furthermore, when using an old solution the colour change will be from blue to pink, which does not change readily to white and gives an untrue end point. The same difficulty may be encountered if the purifying system is not properly removing sulphur dioxide or other acid gases to such an extent that the potassium iodide becomes saturated with them. When the iodine solution to be titrated is concentrated, it is best not to add the starch indicator until most of the iodine colour has been discharged with the thiosulphate. If it is added to a concentrated solution, a flocculent precipitate may result, which obscures a true end point.

Sodium Thiosulphate Solution.—This solution should be

[1] Numbers in parentheses refer to literature cited at end of article.

approximately 0·001 normal—that is, 0·24332 gramme per litre. Before standardization, it should be allowed to stand about four weeks so that equilibrium may be attained, after which its strength will remain constant for several months. The practice followed by this laboratory is to make up a fresh solution each month which is not standardized or used until it has aged for at least one month.

The thiosulphate solution may be standardized against pure iodine solution. Commercial iodine should be sublimed similar to the method given in Treadwell-Hall's "Analytical Chemistry," Vol. II.

The pure doubly sublimed iodine is weighed out very accurately to obtain approximately 0·001 normal solution, and whatever normality is obtained is taken as the standard solution. Iodine is very hygroscopic and vaporizes easily, so it is necessary to use special precautions in weighing. About 2 grammes of potassium iodide and a few drops of water are placed in a weighing bottle and weighed. About 0·2 gramme of iodine is then added and weighed again. The difference in weight is the exact amount of iodine. The solution is then made up to 1 litre with distilled water. If desired, the normality of the iodine may be checked by arsenious oxide as outlined by Treadwell-Hall. However, for ordinary purposes the iodine weight and, therefore, normality may be taken as correct.

The sodium thiosulphate solution is then standardized against the standard iodine solution, using starch as the indicator.

To convert the thiosulphate into terms of carbon monoxide the following typical calculations are involved:

If 0·0974 gramme of I_2 is weighed out per 1000 cc., 1 cc. solution = 0·0000974 gramme I_2. By titration 10 cc. I_2 = 8·37 cc. $Na_2S_2O_3$. Then 1 cc. $Na_2S_2O_3$ = 10/8·37 = 1·195 cc. I_2, or 1 cc. $Na_2S_2O_3$ = 1·195 × 0·0000974 = 0·0001164 gramme I_2. 1 cc. $Na_2S_2O_3$ = 30,701,720/64,674·59 × 0·0001164 = 0·0552 cc. CO at 60° Fahr. and 760 mm. Hg.

DERIVATION OF FACTOR FOR CHANGING CC. $Na_2S_2O_3$ TO CC. CO.—In standard sodium thiosulphate solution as made up, 1 cc. = 0·000127 gramme of iodine, and from the reaction

$$I_2O_5 + 5CO = I_2 + 5CO_2$$

is equivalent to 0·00007 gramme of carbon monoxide by the following equation:

$$140 : 253·8 = X : 0·000127$$
$$X = 0·00007$$

Since 1 cc. of carbon monoxide at 0° C. and 762 mm. Hg = 0·00125 gramme, 0·00007 gramme = 0·056 cc. of carbon monoxide at 0° C. and 762 mm. Hg.

1 cc. of sodium thiosulphate ≡ 0·000127 gramme I_2 ≡ 0·056 cc. CO at 0° C and 762 mm. Hg.

Converting to 15·6° C. and 760 mm. Hg.

$$0·056 : X = 273 : 288·55$$
$$X = 0·0592 \text{ cc. of CO at } 15·6° \text{ C. and } 760 \text{ mm. Hg (dry)}$$

As the sample taken is always saturated, this figure must be converted from dry to saturated. The vapour pressure of water at 15·6° C. = 13·26 mm. Hg.

$$\frac{PV}{T} = \frac{(P' - p)V'}{T'}$$

where P = vapour pressure of water at 15·6° C. Then

$$\frac{760 \times 0·0592}{288·55} = \frac{746·74V'}{288·55}$$

V' = 0·0602 cc. of CO at 15·6° C. and 760 mm. Hg. saturated. Deriving the formula for securing the factor from the above:

$$\text{Factor} = \frac{140 \times 288·55 \times 760 \times X}{253·8 \times 0·00125 \times 273 \times 746·74}$$

where X = grammes I_2 per cc. of thiosulphate.

$$\text{Factor} = \frac{30,701,720}{64,674·59} \times X$$

EFFECT OF VARIOUS GASES ON IODINE PENTOXIDE.

In order to determine the effect of all gases which may be present either in fuel gases or in the products of combustion of gas on the operation of the iodine pentoxide apparatus, these gases were prepared and a known amount of them was drawn through the system. All the chemicals were in place when these tests were made.

Carbon Dioxide.—Carbon dioxide obtained from carbonic acid cylinders was used for these determinations. Mixtures of carbon dioxide and nitrogen containing amounts of carbon dioxide varying from 4·7 p.ct. to 17·7 p.ct. were drawn through the apparatus. No indication of a reaction with iodine pentoxide was obtained.

Ethylene (typical of illuminants).—Ethylene mixed with nitrogen in percentages varying from 0·043 to 1·93 p.ct. ethylene was used. This gas was obtained from cylinders purchased from manufacturers of ethylene for dental purposes. It analyzed 100 p.ct. illuminants. When both chromic acid towers were maintained at room temperature, ethylene was practically completely oxidized by iodine pentoxide at 150° C. The following table indicates the results obtained:

Chromic Acid at Room Temperature.		Chromic Acid at 100° C.	
Ethylene in Sample.	Indicated CO Obtained.	Ethylene in Sample.	Indicated CO Obtained.
P.Ct.	P.Ct.	P.Ct.	P.Ct.
0·0428	0·0414	0·0862	0·015
0·1068	0·1550	0·1735	0·0035
1·930	5·070	0·253	0·0150

When the first chromic acid tower is heated to 100° C. and the second is maintained at room temperature, a large percentage of the ethylene is oxidized or absorbed by chromic acid and the indicated percentage of carbon monoxide is very low, as shown in the above table. These results indicate that, if ethylene is present in combustion products, it is oxidized by iodine pentoxide, and the carbon monoxide results obtained are not exact where the chromic acid is maintained at room temperature. If, however, the chromic acid is heated, most of the ethylene does not reach the iodine pentoxide. The effect of ethylene on iodine pentoxide is substantiated by Gautier (11), who states that ethylene, acetylene, vapours of benzene, and alcohol are oxidized partially by iodine pentoxide.

Oxygen.—Oxygen in concentrations which may be obtained in products of combustion or fuel gas has no effect on iodine pentoxide. This is known because 20·93 p.ct. oxygen in air gives no reaction.

Hydrogen.—Hydrogen was prepared by the action of sulphuric acid on zinc. The gas as prepared analyzed 4·8 p.ct. oxygen, 25·6 p.ct. nitrogen, and 69·6 p.ct. hydrogen. When percentages varying from 0·05 p.ct. to 0·337 p.ct. were mixed with nitrogen, no reaction whatever was obtained with iodine pentoxide.

Methane and Ethane.—For the purpose of these experiments, natural gas containing 80·5 p.ct. methane, 18·2 p.ct. ethane, and 1·3 p.ct. nitrogen was used. Amounts varying from 0·057 p.ct. to 0·428 p.ct. natural gas mixed with nitrogen gave no reaction when passed through the apparatus.

Hydrogen Sulphide.—No reaction was obtained with hydrogen sulphide present in percentages as great as 1·435 p.ct This gas was prepared in the usual manner by dropping hydrochloric acid on ferrous sulphide.

Sulphur Dioxide.—When as much as 3·02 p.ct. sulphur dioxide in nitrogen was passed through the apparatus, no indication of a reaction with iodine pentoxide was obtained. A known amount of iodine was added to the potassium iodide solution, and no interference in obtaining a satisfactory end point in the titration was observed. The sulphur dioxide was prepared by dropping sulphuric acid on sodium sulphite.

CONCLUSIONS.

The iodine pentoxide apparatus developed by the U.S. Bureau of Standards and the A.G.A. Testing Laboratory may be used successfully for routine analysis of carbon monoxide in concentrations as low as 0·002 p.ct. in the products of gaseous combustion when: (1) Carbon dioxide, oxygen, hydrogen, methane, ethane, hydrogen sulphide, sulphur dioxide, nitrogen, and oxides of nitrogen are present in small quantities; (2) formaldehyde is present in less than 1 p.ct. if one chromic acid tower is heated to 100° C. Correct readings cannot be secured where relatively large quantities, 0·04 to 1·9 p.ct., of ethylene are present in the products of combustion.

LITERATURE CITED.

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ASSOCIATION OF PUBLIC LIGHTING ENGINEERS.

SIXTH ANNUAL CONFERENCE AT BOURNEMOUTH.

[The Presidential Address and Papers read were published in last week's "JOURNAL."]

From Monday to Thursday of last week (Sept. 9 to 12), the Association held their Sixth Annual General Meeting and Conference in the Town Hall at Bournemouth, under the Presidency of Mr. S. B. LANGLANDS, J.P., Lighting Inspector, Glasgow. On Tuesday the delegates were the guests at luncheon of the Chairman and Directors of the Bournemouth Gas and Water Company.

The conference opened on Monday evening, with a reception in the Town Hall by the Mayor of Bournemouth (Alderman Charles H. Cartwright, J.P.), who declared open an Exhibition of Public Street Lighting Appliances. He was cordially thanked by Mr. J. F. Colquhoun, of Sheffield (the outgoing President), for the honour done the Association, the members of which were subsequently entertained to light refreshments. An account of the exhibits, so far as they related to gas, follows this report.

On Tuesday morning there was a large attendance at the opening business session of the conference.

The MAYOR extended a civic welcome to the Association, and remarked that conferences of this kind possessed two great assets. In the first place, they brought together the members of the Association, who, by virtue of their occupation, were during the remainder of the year scattered units. In the second place, the meetings were of great value to the towns in which they were held.

POPULATION AND AREA AS AFFECTING PUBLIC LIGHTING.

Proceeding, the Mayor remarked that, although the public lighting of the Borough of Bournemouth might not realize the highest expectations of the members, he would ask them to take into account the fact that towns with a similar population spread over a much smaller area could have good lighting at far less cost than Bournemouth, which was a garden city composed mainly of residences standing in their own grounds. Because Bournemouth was a garden city, with all its beautiful attributes, it must necessarily occupy, in relation to population, a greater area than an urban town. There were 135 miles of roads in the Borough of Bournemouth, all of which had to be lighted more or less effectively; and it could easily be understood that, outside some of the main thoroughfares, it would be absolutely impossible to instal in 135 miles of roads which were used by a population of 100,000 so brilliant a system of lighting as might be employed for the same number of people over a much smaller area. However, this was by the way. The members of the Association were occupied in attempting to solve all the problems connected with public lighting; and it was because they were engaged on so important a task that their welcome to Bournemouth was so cordial.

ALL STREETS SHOULD BE WELL LIGHTED.

Mr. COLQUHOUN, acknowledging the hearty reception that had been accorded the Association in Bournemouth, said the members had looked at the public lighting; and, speaking quite frankly, they had in certain respects experienced disappointment. The Mayor had given them an explanation; but he did hope that the Corporation of Bournemouth would, as a result of this conference, give such assistance to the appropriate officials that there would in future be no need to explain why the borough was not well lighted in all its streets. Good lighting was a valuable asset to any town, industrial or residential.

THE NEW PRESIDENT.

Mr. COLQUHOUN said the next duty assigned to him was the introduction of the new President, Mr. Langlands. This, however, was quite unnecessary, as Mr. Langlands was the "father" of them all. Perhaps he might be permitted to welcome him again to the Presidential Chair. The Association had grown considerably since the time when Mr. Langlands became its first President; and he was sure that he felt proud of this growing "child." During Mr. Langlands' second term of office further progress in the usefulness of the Association might confidently be anticipated. There was also room for expansion of the membership. The Association had done great work for public lighting throughout the country. There was no doubt that by it the public conscience had been awakened to the need of better street lighting.

Mr. S. B. LANGLANDS (Glasgow) then took the chair, amid acclamation, and expressed his pride and pleasure at serving the Association. It was a special gratification to hear the remarks which had just been made, because Mr. Colquhoun, like many others present, was one of his "boys." They all remembered the work which Mr. Colquhoun did last year in Sheffield, in preparing for them a special street lighting demonstration, which had proved of great value. His year of office had been altogether most successful. It was a pleasure to hand him the Association's diploma, which would serve as a reminder of all this good work.

The minutes of the last meeting having been taken as read, it was agreed that Messrs. C. Brown and J. Love be appointed Scrutineers of the ballot papers for the election of Council and officers for 1929-30.

Mr. LANGLANDS then proceeded to deliver his Presidential Address.

LIGHTING AND RATING.

Ex-Bailie JAMES MACDOUGALL (Convener of the Watching and Lighting Committee of the City of Glasgow) read the first of the papers prepared for the conference; and a long discussion upon this brought the morning's session to a close.

Discussion.

Mr. E. C. LENNOX (Newcastle-upon-Tyne) argued that it was part of the city lighting engineer's work to assist in some way to better the lighting of the main highways. He would like the Council to consider this matter, in the hope that a petition would be made to the Ministry of Transport for some different method of rating so far as public lighting was concerned. It seemed unfair that the parishioners should have to meet the expense of lighting their highways because of the huge increase in traffic, over which they had no control. Another point was the way in which the Ministry of Health were regarding loans for street lighting. Many cases had

come to his notice in which either the method adopted was very poor or public lighting was altogether absent, and parishioners were desirous of improvement. The process that had to be gone through was both lengthy and complicated. The lighting of highways should be assisted by grants by the Minister of Transport out of the revenues derived from motor taxation. ["Hear, hear."] There should be collaboration with kindred Associations so as to provide in several parts of the country practical demonstrations of well-lighted highways. Unless something of this kind was done, he was afraid the interest of the public at large would never be secured.

ATTEND TO THE SLUM AREAS.

Councillor THRAVES (Chairman of the Sheffield Watch Committee) stated that in his city they had not confined themselves solely or simply to providing light for reckless motorists and those who were imbued with the speed craze. He was delighted to think that the Immediate Past-President of the Association had sought to make the lives of those who dwelled in the slum districts somewhat more pleasant. The Association would be doing really sound social work, if it endeavoured to improve the lighting systems of the courts and alleys of the cities. The more of these places that were lighted, and the better they were lighted, the less work would there be for those who were responsible for law and order. The present trend of thought was to to concentrate on motorists and main roads; but he hoped that the members, in their official activities, would not be induced to neglect what might seem to be the less important parts of a city.

Mr. A. E. JEPSON (Sheffield) pointed out that a statement of area was necessary to complete the comparative table included in the paper.

COMPULSION COMING?

Mr. COLQUHOUN said that they, as an Association, must be in hearty agreement with the suggestion that the lighting of rural areas was something which could not be left to the urban district councils. The job was far too big for them. In America, many arterial roads were lighted by the various States. The experience of those who were fortunate enough to visit America last year confirmed the view that city lighting was best left in the hands of the local authorities. In many cases it was carried out by companies; but the balance was undoubtedly in favour of the work being done by the local authorities. While the street lighting of this country had been improved, there remained numbers of places where sooner or later something of the character of compulsion would require to be applied, either by the State doing it through the Road Fund or by a national Act. It would therefore be to the advantage of local authorities to consider whether they were carrying out their duties in such a way that, even if the principle of compulsion was applied, nothing would require to be done in their particular area. If they viewed their duties in this manner, there would in many instances be a definite improvement. He hoped he might live to see the day when the streets of a city would have to be lighted according to the standard set down by the specification.

MECHANICAL CONTROL.

He had had five years' experience of clock controllers. There were something over 6000 in Sheffield; and he regarded the fears of the author as unfounded. A man could supervise and inspect 200 lamps with clocks, as against 120 hand-controlled; and he did supervise them, and see that they were lighted, so that the local authority were carrying out to the full the obligation put upon them. There was here mechanical assistance for lamplighters of which he thought it was well that advantage should be taken; with hand control men must be out at all hours of the morning to extinguish lamps. This work could well be done without daily supervision by the clock controller, so that the job was made more healthy and more comfortable, and on this ground alone mechanical control should be considered. But all this was qualified by the point to which the author made reference towards the end of his paper—the varying prices for gas throughout the country. Undoubtedly, if the price of gas was high, there was no point at all in spending money to maintain efficient service. The obvious thing to do was to change-over, if one was not getting a proper supply at a fair price. The price quoted for Sheffield was not quite correct. It should be 1s. per 1000 c.ft., not 11d. The author's remarks were deserving of the careful consideration of the "B.C.G.A." and of the gas industry generally. There were places in which the prices charged for gas were quite unjustifiable; and if the gas industry wished to retain this load, they must set about doing it in a reasonable and proper way. The paper was a very courageous one. He hoped that in ten years' time the statement that "the majority of the cities and towns in Great Britain are simply playing with the quesion of street lighting" would be less true than was the case to-day.

Councillor JOHN CLARKE (Convener of the Aberdeen Lighting Committee) said that in his city the aim was to get a high average over the whole area. The question of courts and slums had occupied a great deal of their attention; and they had done what they could to light them. In addition to this, however, they had taken the still better way of endeavouring to do away with the slums. The motorist, he thought, might be asked to pay for his lighting. The Road Fund should be utilized for the purposes for which it was raised. The whole thing was a question of finance; and it should be remembered that lighting must be subservient to broad questions of public health, so that they could not expect to obtain unlimited resources. Lighting inspectors should understand that it was not indifference, but simply want of resources, which at present was limiting public lighting.

PRICE OF GAS FOR PUBLIC LIGHTING.

Mr. T. WILKIE (Leicester) remarked that in the smaller urban districts it was not possible for the lighting to be the sole duty of a particular official; but in various ways the larger towns could give help to their less powerful brethren. So far as his own city was concerned, it had been able to help the smaller towns round about; and this plan might be extended. Where one had a Gas Committee who not only did not reduce the price charged, but this year had added 3d., making it almost 3s., it was absolutely impossible for the Lighting Committee to improve gas lighting; and they had therefore to go to electricity, which was supplied at a trifle over ¾d. per unit. The Association should tackle the question through the "B.C.G.A.;" for engineers must reduce the price of gas if they wished to retain the lighting load.

Mr. J. H. CLEGG (Burnley) agreed that the gas industry ought to charge a fair and reasonable price for gas. An excessive charge was a suicidal policy; but in considering prices as between town and town, the various services which were included must be borne in mind. Generally speaking, the gas lighting was originally in the hands of the gas industry, who provided the mains, services, columns, and lamps; and they had made an inclusive charge which covered interest and sinking fund on this capital expenditure. The lighting by the gas departments usually embraced the difficult task of illuminating the back courts and other inaccessible positions. He quoted an instance of a mile of main being laid solely for supplying seven gas lamps. The cost of gas in that case was very high; and the price of gas must have some relation to the services provided. Members of the Association could feel assured that progressive gas engineers would do everything in their power to see that gas was sold at a reasonable price. All the gas lamps in Burnley were operated by clock controllers, and the system of inspection was that a man took one-half one night and the remaining half the second night. But even if they were inspected nightly, he could assure the author of the paper that the saving would be substantial. The saving in mantles, the uniform lighting and extinguishing, and the improved labour conditions, were all great advantages.

Mr. C. H. WOODWARD (Bournemouth) pointed out that in the paper the varying prices for gas were compared on the basis of 1000 c.ft. For all purposes of comparison, the figures should be on the basis of the therm.

Mr. G. COWAN (City Engineer's Department, Portsmouth) said he had to look after the street lighting; but this was only part of his duties. The lighting of Portsmouth was partly by the Gas Company, but principally by the Electricity Committee. Taking the ordinary street lamp, the cost of gas was slightly higher than electric light. They were making a considerable improvement in the lighting of main streets by introducing central lighting. This was found to be an improvement of 25 or 30 p.ct. over curb columns. One point about electric light was bad for traffic. The diffusion obtained from gas lighting was not secured with electricity. Only two or three weeks ago a fatal accident occurred which might be put down to the fact that the light from the arc lamps rather interfered with the motorist. He had been told that the blinding effect of the central lights might interfere with motor traffic.

Mr. H. DAVIES (Chesterfield) remarked that Lighting Committees had to put their estimates before the Finance Committee, who had the final voice in the matter. Any saving in one direction in public lighting, instead of going direct to the rates, should be entirely devoted to improvements in other directions. This would be a great help.

Mr. A. C. CRAMB (Croydon) expressed the view that the time had arrived for a little more standardization of prices. For rates charged for gas and electricity up and down the country—and more especially electricity—there could be no justification whatever. There should be no insuperable difficulty in standardizing prices for street lighting. The greater part of the trouble was in getting people into the right state of mind. There ought also to be a minimum standard of lighting, below which there should be no thought of going.

Bailie MACDOUGALL, in reply, said that for half-a-century he had been interested in public lighting affairs. He saw what he thought was the first public electric lamp 51 years ago in Paris.

LUNCHEON.

On the completion of the morning session, a party of about 200 were the guests at luncheon in the Town Hall of the Directors of the Bournemouth Gas and Water Company. Lieut.-Col. Sir CHARLES L. MORGAN, C.B.E. (Past-President of the Institution of Civil Engineers, and Deputy-Chairman of the Company), presided, and, in proposing the toast of the Association, explained that the absence of the Chairman (Mr. William Cash, J.P., F.C.A.) was due to his absence in New York, as one of a deputation of chartered accountants dealing with important matters in America. They had, however, with them another Director, Lieut.-Col. Harold Woodall. It was a pleasure to attend a meeting of this kind; and, on behalf of his Board, he offered the Association a very hearty welcome. At the same time, he expressed their gratitude to the Mayor of Bournemouth, the Mayor of Poole, the Mayor of Christchurch, and other Mayors who had joined them. It said a great deal for the importance of the occasion when gentlemen who had so much to do in their own spheres of activity gave their time in this way. He invited any delegates who might wish to do so to visit the gas and water works, upon, which, under the able guidance of their Engineer and General Manager (Mr. P. G. G. Moon), the Company had stinted nothing. Another point he wished to mention was that the Company were working side by side in the most friendly manner with the electricity undertaking. Each gave and took; and providing this was done in a proper business spirit of competition, it was good for both.

In acknowledgment, the PRESIDENT expressed the deep appreciation of the members of the hearty welcome and hospitality accorded them. It was gratifying to hear of the cordial

relations subsisting in Bournemouth between the Gas Company and the Corporation.

COMPROMISE IN ILLUMINANTS.

The afternoon was devoted to considering the paper, by Mr. C. H. WOODWARD (Lighting Superintendent, Bournemouth), entitled "Compromise in the Use of Illuminants for Public Lighting." A long discussion followed, a few points from which have been extracted.

Discussion.

Mr. HAYDN HARRISON said that what the public lighting engineer had to strive for was to make £1 do the work of £2; and the author had shown how best this could be accomplished. Good appearance did not inevitably denote big capital expenditure; a simple artistic pattern of standard might cost little. He hoped in future the capital charge per foot of lighting would be largely reduced. The object was to light the road, and not to spend unnecessary money on the standards. Thus efficiency should be their first aim. Road surfaces in this country were getting blacker and blacker with the greater use of tar; and he had noticed how much easier it was to see on the concrete roads. The question of road surfaces was one in which he trusted lighting engineers would in course of time have a say. The use of tar had come about by a natural sequence of events; but consideration had never been given to its great effect upon visibility on the road.

Mr. E. H. HORSTMANN, referring to gas controllers, said that it was better always to make the insertion between the lamp-post and the lamp-head, by putting the controller between the two. This had been done in many cases, thus improving the lighting and giving a better effect.

Mr. E. STROUD pointed out that Holophane, Ltd., had been giving much attention to directional lighting of streets. Bare lights were abhorred by lighting engineers; illumination must be controlled.

Mr. E. J. STEWART (Glasgow) remarked that there were very few technical difficulties in connection with street lighting which could not be overcome; the troubles were mainly financial. He went on to deal with the subject of glare.

Mr. G. COWAN said that in Portsmouth span-wire high-power lights gave improved illumination away from the trees. They had adopted concrete roads there in many instances.

Mr. WOODWARD, in reply, admitted that glare was the great bugbear; and they were up against the difficulty that it cost money to suppress it. That was to say, in the first place money had to be spent on providing light which one afterwards had to cut-off.

AMERICAN PRACTICE IN PUBLIC LIGHTING.

[Prior to the business on Wednesday, the President placed a wreath at the foot of the War Memorial in the gardens adjoining the Town Hall.]

Wednesday morning's session opened with a paper by Mr. J. F. COLQUHOUN (Lighting Engineer, City of Sheffield) and Mr. E. J. STEWART, M.A., B.Sc. (Public Lighting Department, City of Glasgow). What follows is an extract only, for the paper consisted mainly of a description of a series of slides relating to the visit of the authors to the United States.

Street lighting held a prominent place at the meetings in America last year of the International Commission on Illumination, and in the demonstrations during the preceding tour. Street lighting in Britain has, indeed, gained much benefit by the formation of its particular Association and by the official linkage thus made possible between the activities of street-lighting engineers and those of other national bodies concerned with illumination. Such are the National Illumination Committee of Great Britain, and the British Engineering Standards Association. We have had such definite joint achievements as the British Standard Specification for Street Lighting, and the demonstrations of its working at the last conference of our own Association. Further, through its representation on the British Illumination Committee our Association has become an integral part of the International Commission on Illumination.

STREET LIGHTING AT THE I.C.I. MEETINGS.

When you look at the bulky volume, the record of the Saranac meetings, you will recognize that it is hopeless in the time at our disposal to give an adequate account of the proceedings and demonstrate their full value to our Association. Even if we confine our words to the sessions of the Street-Lighting Technical Committee, it is difficult to convey all that was accomplished. The report of the discussions alone at these sessions occupies over forty pages in the volume.

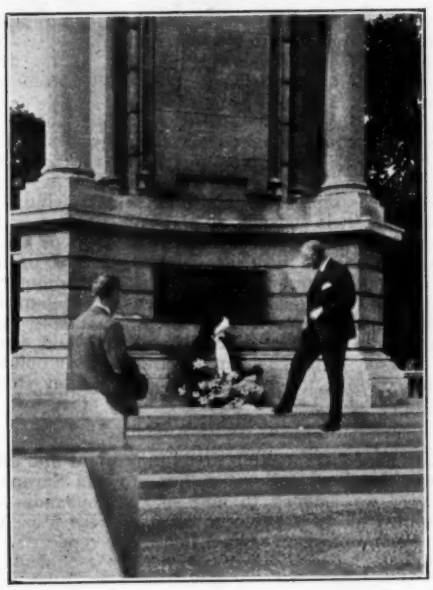
The street-lighting session was accorded first place on the programme after the opening plenary session. We may claim that the subject took a predominant position at the meetings, by the attendances and the keenness of the discussions. The time allowance had to be extended, and actually three sessions were needed before the business was completed by the unanimous approval of a series of resolutions. The very fact of this debate indicates how complicated are some of the problems involved in street lighting and how much information is still required; therefore of how great value is the organization of practical experience and scientific research.

THE BRITISH SPECIFICATION.

The Secretariat Committee, in its report, put forward ten points as matter for discussion. This arrangement was followed. Actually, the centre of discussion was our British Specification for Street Lighting. This had, indeed, been expected, and was welcomed by the British delegates.

Mr. Paterson, in his paper, provided a clear statement of the nature and aims of the specification, and it was heartily endorsed by the British Street-Lighting Sub-Committee as an effective interpretation. Already before Saranac the specification had provoked numerous exhilarating arguments in private conversation with delegates of other nations. The main difference was that the British laid stress on the measurement of minimum illumination in a street, other countries on average illumination. Among the Americans, further, was a school which gave little heed to measurement of illumination at all, and preferred to lay out and evaluate installations by the number of lumens provided per linear foot. The leader of the British Sub-Committee and his colleagues had to point out repeatedly that the specification did not use minimum illumination as a criterion of the effectiveness of an installation, but only as a method of classification. On the other hand, we insisted that no single method of estimation of the effectiveness of a street-lighting installation was satisfactory; but that minimum measurement was the simplest and most practical. In the resolutions put forward by the leader on behalf of the British an important request was that, while other nations were not asked to change their preference for average, they should also give minima in any statistics, to allow international comparison of installations.

It was appearing difficult to get any definite resolutions passed, so spirited was the battle; but at the second session Mr. Sully moved that a Sub-Committee consisting of representatives of Germany, France, America, and Great Britain be appointed



to try to make a definite proposal. This was approved, and our leader was chosen as British representative. The Sub-Committee met, and managed to agree on a series of resolutions, generally on the basis of the British proposals. These were submitted to the third session, and, after another prolonged discussion, the meeting approved them with minor amendments.

RESOLUTIONS.

The resolutions, as finally worded by the Editing Committee and approved by the final plenary meeting, read in translation as follows:

(*a*) Recommending, in order to facilitate international comparisons of public lighting installations, to adopt as essential characteristics:

(1) The average horizontal illumination on the carriageway.

(2) The minimum horizontal illumination on the carriageway. The plane of reference for both these characteristics shall be the surface of the street.

(*b*) Recommending to the Secretariat Committee to investigate whether it is possible to adopt a generally agreed plane of measurement together with the adoption of a suitable type of portable photometer.

(*c*) Recommending to the National Committees to study and to make suggestions to the Secretariat Committee regarding the definition and the practical determination of the degree of brilliance, of glare, and of visibility of a public lighting installation.

(*d*) Asking the Secretariat Committee to prepare a questionnaire for the collection of information on a certain number of public lighting installations representative of modern practice; the information thus collected by the Secretariat Committee to be communicated to the National Committees, who have replied to this questionnaire.

(*e*) Recommending to give as important characteristics of a public lighting installation the electric power used in watts, or the consumption of gas per hour, as well as the generated luminous flux in lumens; these quantities being given per unit of surface and unit of length of the carriageway.

It will be noted that the programme of work in (*c*) has an important relation to our specification and the observations taken at our last conference, especially with reference to the glare clauses. A resolution passed at Saranac by the Technical Committee on Glare to carry out work with a view to obtaining a quantitative measurement of glare is a move in the same direction.

At the close of the third street-lighting session the British leader referred to the valuable paper read by Mr. Halvorson, and proposed a resolution, which was finally approved, in the following terms:

(*f*) Recommending that the Executive Committee form a Secretariat Committee for the study of luminous traffic-control signals and their use.

At the plenary closing session on Sept. 28, the Editing Committee submitted the versions in French—the official language of the I.C.I.—of the resolutions passed at the various sessions; and after considerable debate these were finally approved.

Mr. Paterson, who had fulfilled his duties as President throughout the tour and meetings with such admirable dignity, patient courtesy, and tact, was re-elected.

Dr. Walsh, who, as General Secretary, had secured the smooth working of the I.C.I. machinery, was promoted to be Hon. Secretary.

We hope that the British Street-Lighting Specification will receive as much consideration from the British street-lighting engineers, for whose benefit it was devised, as it did in America. The Street-Lighting Sub-Committee of "B.E.S.A.," on which this Association is represented, is at present revising the specification; or, rather, is considering carefully whether and wherein the specification may need revision in light of the further experience of those who have been applying it, and, particularly, in light of the experience gained through the demonstration at this Association's Sheffield conference and that gained by the British delegation in America. It is most valuable, therefore, for themselves that our members should test and discuss the specification as it stands, and make known their opinions. If they are not making use of the specification, they should also let it be known why.

LESSONS FROM AMERICA.

In America we were looking at lighting plant and effects for about a month; the meetings at Toronto and Saranac lasted several days; we listened to and spoke thousands of words about lighting; many pages of notebooks were filled with observations; many pages of reports have been rendered at home; impressions of the visit have appeared in technical journals from several hands. We can here only recapitulate a few of our general impressions.

The only satisfactory street lighting is by lamps of large candle-power, mounted suitably high and spaced reasonably close—that is, within the limits of the spacing-height ratio of our specification. Bad lighting in America was mainly due to excessive spacing and insufficient height.

Street lighting ought to be kept under the control of the local authority; at any rate in Britain.

The lighting of the streets of a town should be graded according to their importance, but all should be lit well. We have not the super-lighting of some American main streets; but, in spite of many dark spots, we do tend to pay more attention to side streets. The tendency in America, by the design and sales departments of the manufacturers of street-lighting equipment, the electricity supply undertakings, the municipalities, commercial associations, and the public is to put the emphasis on the lighting of a relatively few "show-streets" of a city. Thus everyone concerned gets a "boost."

Yet we must distinguish between American practice and principles. Some American streets are badly lit not because the principles are wrong, but because they are not applied. There is much sound advice in the official contributions of the American Illuminating Engineering Society at Saranac, and such Nela Park productions as "Street Lighting Designs" and "Forty Streets in One." The "Principles of Street Lighting" of the I.E.S. gives an average horizontal illumination of 0·25 foot-candle as the minimum for thoroughfares, attainable at an expenditure of 50-100 lumens per linear foot; for residence streets at least 0·05 foot-candle average, obtainable from 10 lumens per linear foot. Differences, perhaps, from our own ideas, are certain heights recommended and some of the spacings recommended for residential streets, longer than we should like.

As regards theory, the "Principles" recommends that lamps of at least 1000 lumens, and preferably of 2500 lumens and larger, should be used, and that the lowest mounting-height of any should be 15 ft. We agree.

Special consideration should be given to wide streets.

Glare did seem in many installations to be greatly reduced by suitable glassware; though there were others where we found distinct glare from globes of diffusing glass, mounted at (say) 15 ft. In any case, high mounting should be preferred, and also illumination upon the street ought not to be allowed to suffer from absorption in the glass.

Street-lighting in America seemed to be considered more from the artistic than the scientific point of view. Considerable importance was attached to daylight appearance. In many streets efficiency suffered. Yet the use of definitely decorative fittings of simple outline could with advantage be extended in this country. Especially there are towns, such as Bournemouth, themselves decorative, where this is a valuable aspect.

The provision of special cables for street lighting, both overhead and underground, extending over large areas, and of substations devoted to public lighting, seemed to be much more developed in America than in Britain. One accompaniment was the more general use there of remote and centralized control. Automatic lighting and extinguishing were obtained also by time-switches, relays, and other methods used here.

The cheapness of electric bulbs in America as compared with the prices in this country made it possible to use larger sizes.

The "booming" of street lighting in America was mainly due to the manufacturing firms and the local electricity supply companies. It was notable also how largely the laboratories for research on lighting were provided in America by manufacturers. The outstanding exception was the Bureau of Standards. The papers presented at the meetings illustrated the same point. Very little progress was primarily due to the municipalities. Even in this country too little addition to research and practical experiment is contributed by them. Few street-lighting departments are even moderately well equipped for such work, even for necessary routine testing.

The parkways were a pleasing feature in the lay-out of American cities. The opportunity was well grasped to instal artistic lighting fittings. The lighting itself of these roads, carrying large volumes of fast traffic, was fairly good.

A notable development in America which deserves more consideration in this country is the lighting of rural highways which carry heavy traffic between towns. The lighting has been made easier by the bringing of electricity through a district by overhead cables on posts alongside. The lighting-fittings are attached to these posts.

One trait of the American which impressed was his pride in his city and readiness to spend money to make it more admired.

Also street lighting got vastly more advertisement than it does here. The American advertisement does not necessarily "put it over" any other than an American. But we certainly might advertise in our own way when we have good lighting, so that we may ask for more.

1931.

At the I.C.I. meeting the offer was accepted to hold the next plenary meeting in 1931 in Great Britain. Representatives of the Association of Public Lighting Engineers have already been taking part in the preliminary committee work. It will be impossible and unnecessary for the British hosts to compete with the Americans in the display of "biggest in the world" things. But it is possible to show first-class gas lighting, better lighting in side streets, and cities and towns plainly and inexpensively lit, but evenly and with better visibility for the same expenditure than in some leading American cities.

Discussion.

The PRESIDENT (after Mr. Stewart had read the paper) said that they had had a wonderful pictorial and descriptive record of American work.

Alderman J. TAYLOR (Chairman of the Bolton Lighting Committee) referred to the marvellous way in which the Niagara Falls had been harnessed, and also to his own visit to Canada and New York.

Councillor THRAVES (Chairman of the Sheffield Watch Committee) inquired whether the authors had been the more impressed by the spectacular lighting or the useful lighting.

Mr. COLQUHOUN replied that in this country the lighting of the whole area was rightly considered; and this was better accomplished by the municipality doing the job themselves. In America the practice had been, and was still, to concentrate more or less on some of the main streets, and the lighting of these main streets was certainly well done. The cost of that lighting was, however, in many cases borne by the merchants on the thoroughfares. On the other hand, throughout the residential areas, and in some fairly busy streets, the lighting was such as would not be tolerated by British people, who expected a good deal of service from the municipalities, which American people did not.

Mr. J. H. CLEGG (Burnley) said it was eminently desirable, for purposes of comparison, to have international practice as far as possible; and he thought a meeting such as this could give a good deal of assistance to the National Committee in dealing with such a subject.

A DELEGATE remarked that it was evident that glare was very serious in America. He had been struck by the large preponderance of electric lighting in the States. Why had it been so extensively adopted.

Mr. COLQUHOUN said he himself would like an answer to this ques-

tion. Gas and electricity were linked much closer together than in this country; and it might be that the field for public lighting had been given to electricity. This, however, was only a guess. Arterial roads were lighted by the State.

Mr. E. C. LENNOX (Newcastle-upon-Tyne) suggested that the lighting of arterial roads might be placed in the hands of the county surveyor.

The PRESIDENT remarked that this was a thorny subject.

Mr. LENNOX thought that the smaller councils would be very glad if the county councils would take over this lighting.

The PRESIDENT replied that this matter might be left with the Council.

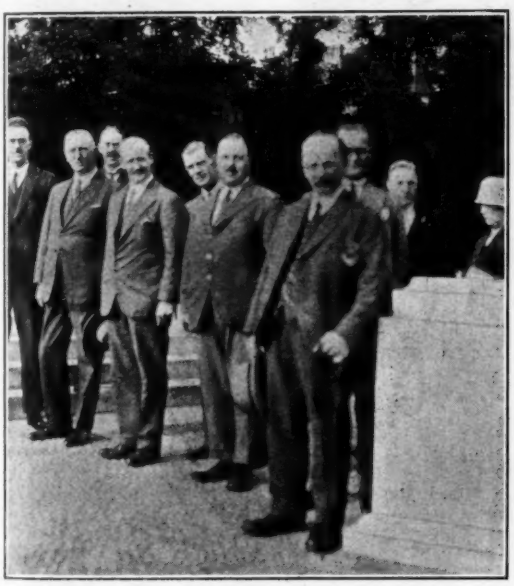
Mr. H. L. BATEMAN (Dewsbury) asked whether the authors had had an opportunity of looking at the best American lighting in mist or fog, and if the electric arcs were better in the States than the lighting which was to be seen in the main important streets in London.

Mr. COLQUHOUN answered that they did not see the lighting under the conditions mentioned.

Mr. H. E. COPP (Hull) said they had had a very instructive paper, which was lucid in every respect.

Mr. A. C. CRAMB (Croydon) thought there was a great deal to be said for an inexpensive fitting, so long as the lines were graceful. Places like Bournemouth, of course, could well spend money on ornamental fittings. These towns must be made as beautiful as possible; and artistic street lighting would do much in this direction. It seemed to him that there was little they could learn from America regarding street lighting generally as a result of the visit of the authors; but towns like Bournemouth could learn a big lesson from the attempts which had been made in America in the direction of lighting parks, &c.

Councillor R. DEMAINE (Bolton) said it would be useful to have information as to the conditions in the matter of public lighting which existed in the big industrial towns.



SUGGESTED COUNCIL'S REPORT.

Mr. J. S. DOW remarked that the authors had given an excellent survey of what had been done in the United States; but one did not always hear quite enough of what was being done here. In the Presidential Address an annual report of the Council had been promised. He suggested in connection with this that each year there should be collected from the different districts some data of what was being done, and then at the annual meeting they would have an interesting summary of the things that had happened during the preceding twelve months. In this way they would gather what progress was being made, and show people at home and abroad that they were pushing forward.

The PRESIDENT replied that Mr. Stewart had been appointed to prepare this report; and he desired to secure what was best from the various towns.

PRIVATE LIGHTING AS AN AID TO PUBLIC LIGHTING.

Mr. J. S. DOW (Hon. Secretary of the Illuminating Engineering Society, London) presented the final paper of the meeting.

Discussion.

The PRESIDENT, in opening the discussion, referred to the vast amount of work on the subject of illumination which had been done by Mr. Dow and tht late Mr. Leon Gaster.

Mr. E. STROUD (Holophane, Ltd.) said the paper seemed to him to be an attempt to push public lighting on to the private individual. It would be better to light the street efficiently. Possibly the proper way of lighting a street would be close spacing and reflectors very high up; but it was a question of cost, and therefore his firm had designed refracting appliances so as to distribute the light over wider areas. This was a compromise, as street lighting under present conditions must be. When people were prepared to incur the necessary expense, the lighting could be provided.

Mr. HAYDN HARRISON remarked that in early times householders had to put up lights over their doorways; but now things had so changed that one could not even compel a householder to let one fix a light on his premises. This was a very serious matter; and he did hope that continued effort would be made to secure such powers in every town in the country. The question of combination

of interests in public lighting was important; but some persons did not want public lighting at all, and so might be disinclined to pay for lights over their houses.

CLOSE SPACING ESSENTIAL.

Mr. W. J. JONES said that the suggestion regarding the spacing of lighting units had interested him. In stating that it was an almost impossible problem to furnish adequate illumination from lamps at intervals of 100 ft. or more, Mr. Dow had put his finger on their greatest difficulty. It was only possible to give first-class illumination if one had close spacing. Therefore the money must be forthcoming. The "B.E.S.A." specification would be vastly improved if it were possible to include some maximum spacing for lighting units. The time would come when architects would be consulted as to street lighting in important thoroughfares. He had seen instances

of lighting house numbers, and the plan had greatly impressed him. The President, he believed, was already responsible for the lighting of stairways in certain parts of his city. Why, therefore, should he not be equally responsible for lighting house numbers and names in other parts. [Laughter.] In portions of Berlin there were companies who were prepared to instal and maintain lighting of house numbers for something like 12s. per annum. In existing circumstances, it appeared to be a necessary adjunct to good street lighting.

Mr. S. E. BRITTON (Chester) said that this was the first meeting of the Association he had attended, and he was greatly impressed by what he had seen and heard. To his mind, their first aim should be to meet the need of the pedestrian; and he was rather inclined to think that, by concentrating so much on vehicular traffic, the interests of the pedestrian were likely to be overlooked. It was quite impossible to get a scientific system of lighting in rural thoroughfares; and the most one could hope for at present was spot lighting which would lead one from point to point. What they were out for was light, and to make the fittings as insignificant as possible. It was on light that the money should be spent, and not on ornate fittings. Where the gas or electricity was furnished by the local authority, he thought it should be supplied at cost.

Mr. G. COWAN (Portsmouth) stated that he would go back to his Council with plenty of information, as the result of the conference. The general distribution of light was of great importance. The more one lighted the main streets, the worse the side streets appeared in comparison.

Councillor JOHN CLARKE (Convener of the Aberdeen Lighting Committee) declared that the idea put forward in the paper was perfectly practicable. If private lighting could be co-ordinated with the public lighting, so as to make a complete system. it would be a saving to the general funds and would be an aid to illumination. He hoped that Mr. Dow would "stick to his guns," and see that the proposal had a fair chance.

Mr. Dow, in replying briefly to the discussion, said to the members: "You should not be satisfied with what exists, but should keep your eyes on circumstances as they arise to get something better."

COUNCIL AND OFFICERS FOR 1929-30.

The election was announced of the following:

Vice-President.—Mr. T. Wilkie, Leicester.

Hon. Treasurer.—Mr. E. M. Servern, London.

Hon. Editor.—Mr. E. J. Stewart, M.A., B.Sc., Glasgow.

Hon. Secretary.—Mr. W. J. Liberty, London.

Members of Council (two vacancies).—Messrs. Arthur M. Bell, Public Lighting Superintendent, Tottenham; and Charles Stuart Shapley, Engineer and Manager, City of Leeds Gas Department, and President of the Institution of Gas Engineers.

PLACE OF NEXT MEETING.

Alderman A. HILL, J.P. (Chairman of the Leicester Corporation Lighting Committee), extended a hearty invitation to the Association to visit Leicester for next year's conference. Great strides had been made in the public lighting there, especially during the last ten years; and this might be partly due to the fact that they went to Glasgow to find a man who had been trained under the President. Fortunately, the Lord Mayor for next year was well known to the members—Councillor W. E. Hincks, ex-Chairman of the Lighting Committee.

The invitation was unanimously accepted. Thereafter votes of thanks were passed to Mr. Colquhoun, for the manner in which he had carried out the duties of President; to the Mayor and Corporation of the County Borough of Bournemouth, for the facilities granted for the conference and exhibition, and

their hospitality; to the Directors of the Bournemouth Gas and Water Company, for their hospitality; and to the Council and officers, for their services during the past year.

ANNUAL DINNER.

On the Wednesday evening, there was a return to the Town Hall for the annual dinner, with the PRESIDENT in the chair. The toast of "The Corporation of Bournemouth" was entrusted to ex-Bailie JAMES MACDOUGALL (Glasgow), and was responded to by the MAYOR, who remarked that from a humble beginning 120 years ago had sprung a town of 100,000 inhabitants, possessing every modern advantage. From the earliest days those who governed the town had evinced the greatest faith in its future.

The proposer of "The Association of Public Lighting Engineers" was Councillor J. C. MCKECHNIE (Convener of the Edinburgh Lighting Committee), who said it must be remembered that public lighting could not be the same all over the country. It seemed to him that the American method of having patches of brilliant light was a very dangerous one. Altogether even illumination was undesirable, but so was the making of too great a contrast. As to the cost of lighting rural roads, there was now a new Government; and this might be one of the things they would undertake, in addition to the upkeep of important highways. In reply, the PRESIDENT referred to the remarkable growth of the Association. If this growth was to continue, faith and courage must be their key notes. There must be co-operation; and this they had practised. In all civic affairs there were services which were essential, and others which were luxuries. If they concentrated on essentials such as lighting, they would go forward.

Mr. C. C. PATERSON, O.B.E., M.Inst.C.E. (President of the International Commission on Illumination), submitted "The Visitors." In the course of his reply, Lieut.-Col. K. EDGCUMBE, M.Inst.C.E. (President of the Institution of Electrical Engineers), congratulated the Association upon having got together so excellent an exhibition. He often doubted whether those who were not in the profession realized the importance of the public lighting engineer. Street lighting had a most potent influence upon the prevention of street accidents; but he was not at all sure that bad lighting was not almost worse from this point of view than no lighting at all. It was not the fault of the public lighting engineer that the necessary work was not done.

Mr. HAROLD E. COPP (Vice-President of the Institution of Gas Engineers), whose name also was coupled with the toast, said he was there representing the President of the Institution, Mr. Shapley, who was in Scotland. He (Mr. Copp) thought he had been one of the first to have any high-pressure gas lighting in this country. It was a German plant, named the "Millennium" system; but it blew off so many mantles, and cost so much to maintain, that it soon came to an end so far as he was concerned. He was one of those who believed that competition between gas and electricity for public lighting was a very healthy situation; for it was only by competition that better methods were evolved. In certain positions electricity was to be preferred; and in such cases he recommended it, not only for public but also for private lighting. It was for this reason that the Association was so welcome. It consisted of public lighting engineers, who would recommend the system best suited for a particular place. They did not require too much standardization, but the best thing for each occasion, which would be evolved only by healthy competition. He, too, congratulated the promoters of the exhibition.

EXHIBITION OF LIGHTING APPLIANCES.

In connection with the conference, there was a conveniently arranged exhibition in the Town Hall of public street lighting appliances. So far as these had reference to gas, they are briefly noted below.

British, Foreign, and Colonial Automatic Light Controlling Company, Ltd., Bournemouth.

During the proceedings at the meeting, there were a good many references to automatic lighting and extinguishing apparatus—a fact which shows that interest is fully maintained in this popular method of dealing with public lamps. Among the apparatus shown in the exhibition was the well-known "Gunfire" controller, which is a speciality of this Company. These appliances can be had in various forms to meet different requirements.

Bromford Tube Company, Birmingham.

A display was made by this firm of new lighting standards in seamless steel, the objectives aimed at in the design of which have been graceful appearance and a high standard of utility. Particular attention was drawn to the fluted columns (patents applied for), which are being reproduced with either spiral or vertical flutes, or with these two types combined, if so desired. This fluting gives a distinctive and pleasing appearance to the standards. With these tubular standards, it is pointed out that, in the event of a vehicle colliding with the standard, the effect would be to bend, not break, the pole. Thus, not only is possible danger to the public avoided, but the standard can be used again after re-straightening.

These steel standards are the result of many years' work, and special plant has been installed for their production. It is remarked that they are lighter in weight than cast iron, and consequently easier to handle and cheaper to transport; and they can be supplied with various types of bases to meet individual requirements. As a protection against corrosion, all parts of the column below ground level are treated with special preservative solution, and can also be wrapped with impregnated hessian, if desired.

William Edgar & Sons, Ltd., Blenheim Works, Hammersmith.

On this stand was to be seen the well-known Caxton "P" lantern for inverted lighting. This is a square lantern, fitted with a hinged canopy, allowing of easy access to the burner, &c., for replacement of parts. The burner is regulated, both as regards gas and air adjustment, from outside the lantern. The gas and air adjustment screws are provided with lock-nuts, which, when the adjustment has been correctly made, are tightened—avoiding movement from traffic vibration or any other cause. The lantern can be fitted with a by-pass or, if for torch lighting, with the "Edgar" patent roller trap.

Foster & Pullen, Ltd., Bradford.

There was to be seen a selection of this firm's square lanterns and inverted lamps, suitable for public lighting, together with superheater burners of various sizes for use in existing lanterns, acetylene torches, controllers, and a complete range of accessories for this class of lighting. By arrangement with Messrs. Holophane, Ltd., a special feature was made of "Holophane" prismatic directional refracting plates, as applied to gas lighting. These plates were described and illustrated in "JOURNAL" for Feb. 20, 1929, p. 494, and in the August number of the "Gas Salesman" in "An Elementary Treatise on Gas Lighting."

The Gas Meter Company, Ltd., Kingsland Road, London.

This Company again exhibited and demonstrated the action of their popular "London" controller, with the slogan "It pays for itself." A controller was shown operating the burners of a "Sugg" "Littleton" (upright fixing) lamp. Many of this type are working at Scarborough and other towns with great success. There were also noticed controllers operating cluster burners of various makes, which at lighting time light-up the complete cluster in the street lamp, and at a predetermined time extinguish one section, the remaining section being extinguished at daybreak or other time. Another controller was seen operating two "Sugg" back-fixing lamps, using distant seals, and arranged so that lighting could be operated by hand, and extinguishing by clockwork. This controller is specially adapted for shop lighting, by means of a patent device, and can be arranged to light and extinguish burners on six out of seven days of the week. On the seventh day, generally the Sunday, the controller does not light-up. This ingenious arrangement is eminently suitable for showrooms where lighting is required after business hours on six days of the week. Where installations are required to deal with large supplies of gas, cocks up to 1 in. can be fitted to the "London" controller, with very satisfactory results.

All the above are of the double train type, and special attention is drawn to the following points: The valve is not operated direct from the dial, and thus does not strain the escapement. It is operated by a second train of wheels, independent of the time-keeping mechanism; and this is a great improvement. The by-pass is extinguished directly after the burner lights-up, thus effecting a saving in gas. The setting of the pointers and dial is very simple. The patent valve (a most important feature, which is practically frictionless) is specially arranged so that it can easily be cleaned when required.

The Company were also exhibiting a new controller, the "Kingsland," which is of the single-train type. This controller is adapted to ordinary street lamps, and is arranged so that, by a simple operation, the clock can be removed from the cock without disconnecting that fitting. The plug is of special make, metallized to reduce friction to a minimum. The action of the valve is simple, ensuring instantaneous lighting and slow extinguishing. The by-pass is arranged to extinguish shortly after the burner lights-up, and is relit before extinguishing.

Holophane, Ltd., Elverton Street, Vincent Square, London.

Hitherto Holophane, Ltd., have confined their efforts in the design of directional prismatic refractors for street lighting to electric lamps. Last year, at the Sheffield conference, through the courtesy of Mr. J. F. Colquhoun, the Public Lighting Engineer, they were able to make a preliminary trial of the

special prismatic plates for gas lighting. These plates, which are made of special heat-resisting glass, were primarily designed for use with the square type street lanterns.

Although they have only been available a short time, they have excited a great deal of interest, and, following on their development, the Holophane Company have had a number of inquiries for similar directional refracting glassware for use with the circular type of cluster burner suspension lamp. Trial refractors of the circular type have been designed on this basis; and the firm were able to show, for the first time, this application. In the same way that the Holophane Company have augmented their range of refractor glassware for electric lamps, there is no reason why, if sufficient interest were aroused, a similar development should not be attained in the gas industry.

Engineering service in regard to the use of these refractors, or in relation to any street lighting problem, will be furnished without charge upon application to Holophane, Ltd.

Horstmann Gear Company, Ltd., Bath.

This firm displayed a complete range of "Newbridge" automatic clockwork controllers for square lanterns, upright harp, and suspension lamps. In addition to controllers for plain "on" and "off" action once or twice in 24 hours, there were to be seen a considerable number of midnight reduction models, the use of which enables public lighting costs to be substantially reduced. All "Newbridge" controllers for square lanterns are now provided with rust-proofed heavy gauge steel cases, with hinged covers, and are remarkably robust and long wearing.

A few samples of the "Newbridge" positive distance gas switch for indoor lighting were also on view. Although these are primarily designed for domestic gas consumers, they will be found useful in many cases for the control of gas lights in public buildings, municipal flats, &c., under the supervision of public lighting engineers.

Lighting Trades, Ltd., and The Welsbach Light Company, Ltd., 30/31, Farringdon Street, London, E.C. 4.

This was a joint exhibit; and a central pyramid of "Welsbach" and "Ironclad" incandescent mantles, ranging in size from ½ in. to 9 in. high, and in candle power from 5 to 7500, immediately conveyed to the visitor how completely these Companies cater for the mantle requirements of the gas industry.

Another important feature of the exhibit consisted of demonstrations of the lighting efficiency of "Renown" magnesia superheater burners, which are being used in increasing quantities for public lighting work. "Renown" burners are now being made for clusters of two to twelve mantles, either bijou or No. 2 size, with the nozzles (which are detachable) arranged in various formations according to the size of the pre-heating chamber. The advantage of the "Renown" superheater lies in the unique construction of the interior, which can be modelled when the material is in the plastic state to the design which careful and prolonged experiments and scientific data have proved to produce the utmost efficiency. "Renown" burners were shown on a number of street lanterns fitted with automatic controllers regulated to demonstrate continuous lighting and extinguishing. It is claimed that the design of "Renown" burners is such as to eliminate back-firing even with greatly reduced pressure, and that the lighting and extinguishing action is smooth and silent.

Municipal Supplies, Ltd., Salisbury Road, Edinburgh.

On this stand were seen various types of gas lamps, as well as a range of hospital and workshop daylight electric lamps of the latest type, and various tools and gadgets used by lighting departments.

A small, handy, collapsible ladder, suitable for a cyclist to fix to his machine, and yet sufficiently strong to allow him to reach the ordinary street lantern and regulate any mantle, should be of great interest to lighting engineers with scattered areas.

W. Parkinson & Co., London and Birmingham.

This firm exhibited a comprehensive range of street lamps and public lighting requisites. There was on view the "Blackpool" pattern lamp with burners arranged in tiers (Patent No. 311,522). This lamp is of the square type; but the patent burner is also supplied in circular lanterns and suspension and "U" fixing lamps ("1100" and "1200" series). The arrangement of the burners results in a very important increased illuminating effect from any given number of mantles.

The firm also showed all types of street lamps fitted with burners having mantles in alignment (not in clusters). This arrangement obviates the loss caused by the mantles screening one another; and the maximum illumination is therefore directed along the street. A selection of burners for street lighting purposes was exhibited. These are now usually supplied metallized, thus avoiding the corrosion caused by the constant contact of the products of combustion. The arrangement of the mantles in alignment is also carried out with conversion type burners; and some of these can be very suitably adapted for midnight reduction.

The question of traffic danger signals is now engaging the attention of all lighting authorities; and Messrs. Parkinson displayed a novel form of danger sign. This is equally effective day and night; and during lighting hours the sign is illuminated by means of a suspension arc lamp attached to a swan-neck fitting. The sign is of neat appearance, and can easily be fitted in position.

William Sugg & Co., Ltd., Chapter Street, Westminster.

Street lighting fittings of their various well-known types were to be seen on the stand of this firm. Special mention may be made of the upright "Littleton" lamp, the bracket type of the same lamp for suspending from tramway standards, and also the pattern with swan-neck fitting; the "Rochester" suspension lamp; the "Promenade" lamp; the "Windsor" lamp, including one equipped with "Holophane" directional refracting plates; and the "Grosvenor" lamp. There were also lamps for garage lighting, back lamps for special purposes, and an assortment of conversion fittings for existing lamps, governors, controllers, &c.

FUSION POINT OF COAL ASH.*

The modern tendency towards the mechanization of all the operations entailed in industrial processes is leading to more and more comprehensive investigation and scientific control of all the properties of the materials and components which are undergoing treatment. The manual labour involved in the clinkering of gas producers and generators, in which all types of solid fuels are being consumed, is being rapidly replaced by mechanical ash-removing apparatus. Of these, there are two main types; and it is interesting to note that they may demand widely different properties in the ash with which they are called upon to deal. The more common of the two includes the various classes of rotating, revolving, and travelling grates in which some form of continuously or intermittently actuated grate bar, plough, or "wiper" is responsible for removing refuse from under the fuel bed. In competition with such systems is the slagging type, in which conditions are so adjusted that all the ash is brought to a fluid condition, sinks to the bottom of the furnace, and is removed by "tapping" or running off periodically as in the case of blast furnaces.

Until the development of the last-named type of furnace the call has universally been for fuels containing ash of very high melting-point, so as to avoid the deleterious effects of a fusible clinker, particularly from the point of view of eliminating possible obstruction of the passage of air through the firebars. On the other hand, it is obvious that with the introduction of the slagging furnace the tendency would be to create a demand for the fuel with a readily fusible ash. Thus, because of the variation in available fuels and the variety of properties required in them, there is developing a scientific technique in the control of the type of residue which will result from the combustion at high temperatures of coal or coke. It is becoming fairly common practice to employ steam in order to render clinker softer and more tractable where this has to be broken up for removal; in other cases the addition of fluxes, such as lime, is made to the fuel so as to aid in the slagging of the ash.

Considerable attention has been devoted to the development of methods for the determination of the fusibility of coal ash, and it is recognized that a classification of coals according to this property is becoming of increasing practical importance. To those who are familiar with what is at present known of the constitution of coal, it will be obvious that the problem is far from being a simple one. Coal ash consists essentially of a heterogeneous mixture of the oxides of perhaps a dozen metals and non-metals. The composition of the mixture not only varies from coal to coal, but also varies considerably as between the different bands or layers of each particular piece of coal. Furthermore, the melting-point of most of the constituents is influenced considerably by the presence and the proportion of other constituents in the mixture. Thus, for example, the highly infusible silica and alumina always present in coal ash are rendered easily fusible by the presence of a high proportion of lime, iron oxide, or the oxides of the alkali metals. Another factor of the utmost importance in connection with the melting-point of coal ash is the influence of the atmosphere in which the heating is carried out. The extent of this will be realized when it is stated that the value obtained may be 200° C. higher in an oxidizing atmosphere than in a reducing atmosphere.

It is thus obvious that the condition under which the fusion-

* Department of Scientific and Industrial Research. Fuel Research. Technical Paper No. 23. "The Fusion-Point of Coal Ash" (Part I.), by J. G. King, Ph.D., A.R.T.C., F.I.C.; A. Blackie, M.A., F.Inst.P.; and J. O'N. Millott, B.Sc., A.I.C. London: H.M. Stationery Office, Adastral House, Kingsway, W.C. 2, 1929. Pp. IV. + 20. Price, 1s. net.

point of coal ash is to be investigated must be carefully standardized; preferably the determination should be carried out under conditions approaching those prevailing in a fuel bed, so that the values obtained should be an indication of the temperature at which clinker would be formed in practice.

Valuable work in this connection has been carried out at the Fuel Research Station, and the results are embodied in Technical Paper No. 23, which has just been published by the Department of Scientific and Industrial Research. The work has been carried out in collaboration with the Bureau of Mines, Washington, U.S.A., with whom samples of ash were interchanged, and the methods of determination correlated so that the results obtained in the two laboratories are comparable.

The publication describes in detail the furnaces and methods which have been evolved for the determination of

(*a*) the temperature of initial deformation (softening-point), and

(*b*) the fusion temperature (complete fusion-point),

under both oxidizing and reducing conditions.

Results of analysis and fusion-point determinations are tabulated for specimens of ash from ten American coals ranging from sub-bituminous coal to anthracite, and from ten representative British coals selected from various coalfields.

For the determination, the ash is ground to a very fine powder, moistened with a 10 p.ct. solution of dextrin, and moulded into a triangular pyramid 1 in. in height and ¼ in. along the side of the base. For the quantity of ash required to make such a cone a considerable amount of coal would have to be ashed in the laboratory, probably several hundred grammes. It will be noted that the cones prepared by the Bureau of Mines are considerably smaller (the corresponding dimensions being ¾ in. and ¼ in.) and require much less material.

It appears rather unfortunate that a cone of the above dimensions should have been adopted at the Fuel Research Station. Modern industrial conditions demand that laboratory determinations be carried out with the utmost expedition; and it would be extremely useful if it were shown whether the above method would give results comparable with those obtained by a method of determination which has found considerable favour in many laboratories. In this, the small amount of ash produced in the ordinary ash determination suffices for making the tiny rod (about 5 mm. long and 1 mm. in diameter) on which the fusion-point test is carried out. In laboratories where considerations of time and available space are important factors there are obvious advantages in the use of such small test-pieces, particularly as the furnace requisite for the determination is of the nature and actual size of half a firebrick with two 1-in. diameter holes drilled through at right angles; the heating is carried out in this by means of an oxy-coal gas blowpipe flame, while the test piece is enclosed in a silica tube into which an oxidizing or reducing atmosphere may be admitted.

For the scientific investigation of the fusion of ash the method under review should prove extremely useful, and the publication is another instance of the valuable work being carried out at the Fuel Research Station in connection with the Physical and Chemical Survey of the National Coal Resources.

TAMBT.

TOWN GAS SUPPLY FROM COKE OVENS.

By JAS. K. DICKIE, A.M.I.Chem.E.

[Before the North British Association of Gas Managers, Sept. 12.]

In introducing the subject of coke oven gas to an association of gas engineers, I feel that I am touching upon a subject which only a few years ago would have been met by very doubtful interest and adverse criticism, but which I believe to-day is a subject of extreme importance to the gas industry as a whole. The change in attitude is no doubt due to the fact that coke oven gas supply schemes have gradually developed from year to year, and the doubts as to quality of the gas, and regularity and continuity of supply, have been dispelled. This, together with the confidence which other important countries have shown towards coke oven gas, has created considerable interest and investigation by the British gas industry and the Government.

It is my object principally, however, to acquaint you with the development and progress of coke oven gas, rather than to deal with any particular part of the subject; and it may be of interest if I outline the development of the coking industry, in order to show why coke oven gas is only now becoming available in large quantities for town gas supply.

COKE OVEN DEVELOPMENT.

The primary object of the coking industry was, and is to-day, to produce coke. The coke manufactured is used principally for metallurgical purposes, and the manufacture of this type of coke was originally carried out in beehive ovens without recovery of bye-products or gas. It would seem that the manufacture of coke must have been a fairly profitable business at that time when such valuable bye-products were allowed to go to waste. Conditions change, however; and though there are still a few beehive ovens in existence, these ovens were gradually replaced by the bye-product oven where recovery of tar, benzole, and ammonia was practised. The latest development is the modern regenerative coke oven built of silica refractory material and manufacturing coke and bye-products, also yielding for disposal between 50 and 60 p.ct. of the coal gas produced per ton of coal carbonized, the remainder of the gas being returned to the ovens for heating purposes or for carbonizing the coal. This portion is termed the fuel gas. There is also an improved regenerative type of coke oven, described as the combination type, which can be heated by producer gas or blast furnace gas, enabling the total volume of rich gas produced per ton of coal to be recovered for distribution. The average quality of gas produced from either system is between 500 and 520 B.Th.U. gross.

The use of the regenerative coke oven was early recognized by the American coking industry, which was, comparatively speaking, only in its infancy when the regenerative oven was designed; and they commenced reconditioning their plants and developing new schemes while this country was at war. In Great Britain conditions since the war have not been conducive to the spending of large sums of money in completely remodelling old, and in some cases obsolete, plants; and it is almost correct to say that without an outlet for surplus coke oven gas the expense involved in erecting modern plant is hardly warranted. Re-organization, however, has been slowly proceeding; and the disposal of surplus coke oven gas to gas undertakings is increasing annually. The chart showing coke oven gas purchased by gas undertakings in Great Britain from 1921 to 1927 indicates that steadily increasing quantities are being taken every year with the exception of the year 1926, where deliveries were affected by the coal stoppage. If we compare the deliveries in 1927, for instance, with the year 1921, we have an increase in six years of 4015 million c.ft.; and it is known that the corresponding figures for 1928 and 1929 will be further increased, and that when these figures are published we may look for an average increase per year of approximately 1000 million c.ft. of coke oven gas for public use since 1921. It is also of importance to consider that this increased volume of coke oven gas has been taken at the gas industry's own option and by mutual agreement between the two industries. Difficulties which existed have been overcome and contracts have been arranged giving guarantees of quality, purity, and calorific value.

GAS GRID SCHEMES.

The attention of the Board of Trade has been directed by the National Fuel and Power Committee to this new system of gas supply. It is realized that by a combination of gas-works and coking plants in well-defined and suitable areas where bye-product coking is practised, coke oven gas could be utilized to the advantage of the gas industry and to the improvement of the coal and coking industry by providing a gaseous fuel that can be offered at lower cost to the public.

In the area which is now under consideration—namely, between the Humber and Liverpool and between Leeds and Birmingham, the Area Gas Supply Committee have excellent ground to work upon; and it is hoped that as a result of their investigations some solution may be found that will enable the gas industry and the coking industry to get together on this question of coke oven gas for their mutual benefit and as a national advantage.

QUALITY OF COKE OVEN GAS.

In modern coking plants a coal gas of regular and even quality is produced. This gas is very similar to the gas produced from horizontal gas retorts, though the carbonizing temperatures in modern coking practice will exceed that of horizontal gas retort operation. For comparison is shown the analysis of normal straight coal gas and coke oven gas after removal of benzole.

	Normal Straight Coal Gas.*	Coke Oven Gas.
	P.Ct.	P.Ct.
Carbon dioxide	3·50	3·50
,, monoxide	7·75	8·10
Unsat. H.C.	3·50	3·40
Oxygen	0·25	0·50
Hydrogen	47·00	47·70
Methane	27·50	27·00
Nitrogen	10·50	9·80
Calculated C.V.	518 B.Th.U. gross	520 B.Th.U. gross

* Authority—Alwyne Meade. "The Composition of Town's Gas."

It will be seen, therefore, that coke oven gas is a very similar

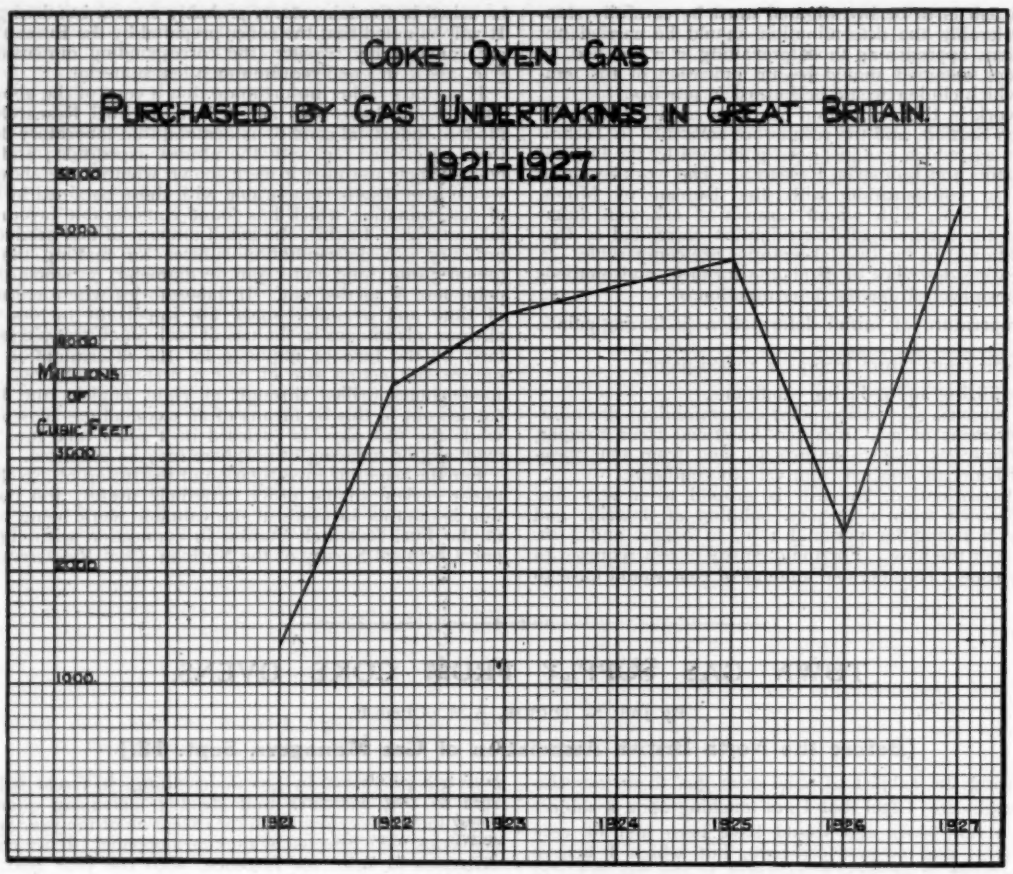


FIG. 1.—CHART SHOWING COKE OVEN GAS PURCHASED BY GAS UNDERTAKINGS IN GREAT BRITAIN FROM 1921-1927.

product to that which the gas engineer is accustomed to handle, and when purified is a gas of standard quality which presents no difficulty as regards distribution and use as a town gas. The undernoted table is a record of the average calorific value of gas supplied from a large coking plant in the Yorkshire area for the year 1928.

Month.	Average Calorific Value.
January	523 B.Th.U. per c.ft. gross
February	518 " " " "
March	522 " " " "
April	520 " " " "
May	520 " " " "
June	521 " " " "
July	520 " " " "
August	520 " " " "
September	519 " " " "
October	524 " " " "
November	526 " " " "
December	530 " " " "

The quality chart produced shows the regularity of calorific value supplied from a coking plant to meet the requirements of a gas authority at 480 B.Th.U. gross.

Coking plants are supplying gas of varying quality to meet the requirements of the gas authorities. Gas, however, is being supplied by gas authorities varying between 400 and 560 B.Th.U. It is rather difficult to understand why there should be a need for this variation with a standard commodity like gas; and where gas grid schemes are concerned, a standard calorific value would require to be set suitable to the gas-works and coke oven plants supplying the grid company. This standard might be satisfactorily set to meet the requirements of the two industries at a calorific value of 500 B.Th.U. gross, allowing a reasonable margin above and below this figure.

Reliability of Coke Oven Gas Supply.

When considering schemes for the co-ordination of the gas and coking industries in connection with town gas supply, the question of the reliability of coke oven gas has often been raised. With a modern coking plant there need be no anxiety over this question of continuous supply, and the coking industry is prepared to guarantee the supply of gas and to satisfy the requirements of a gas grid in the same manner as a gas-

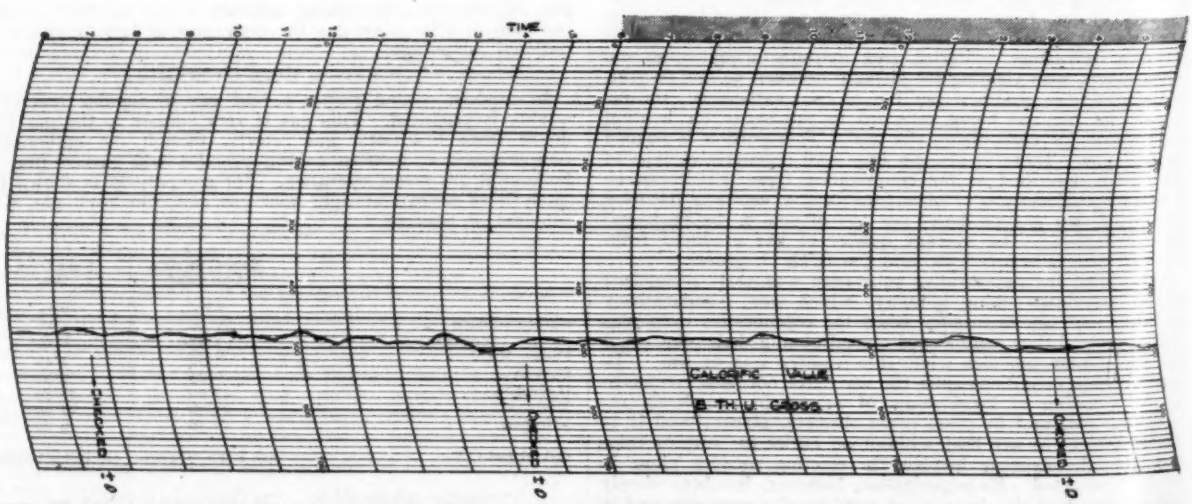


FIG. 2.—CALORIFIC VALUE CHART OF COKE OVEN GAS TO MEET THE REQUIREMENTS OF A GAS AUTHORITY AT 480 B.TH.U. GROSS.

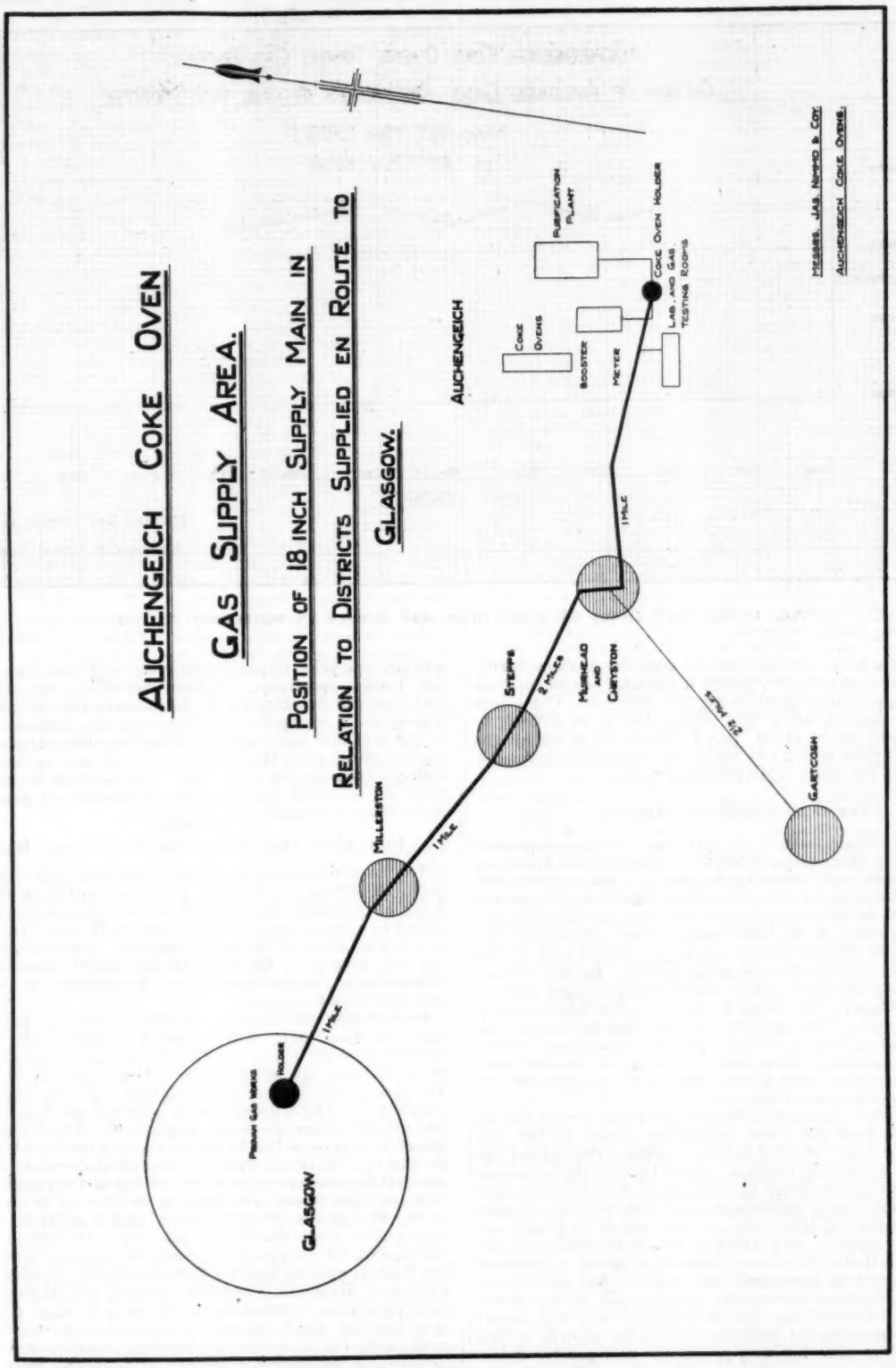


FIG. 3.—OUTLINE SKETCH OF COKE OVEN TOWN GAS SUPPLY IN SCOTLAND.

works. In one of the most recent contracts arranged by a coking concern the supply has been guaranteed throughout all circumstances, allowing for an increase in the price of gas should the coking concern require to purchase coal at a higher price during a strike period in the coalfields.

VALUE OF COKE OVEN GAS.

One feels, when approaching this part of the subject, that one is perhaps getting on to rather thorny ground. The sale price of the gas, however, is undoubtedly one of the most important factors to the authorities who are responsible for the disposal of the gas to the public. I am of the opinion that it does not seem appropriate, where purified town gas is being offered with guarantees as to volume, quality, and calorific value, that gas authorities should endeavour to fix the price at a figure substantially lower than their own costs of production over a period of (say) four to five years. I will quote some figures recently published on gas-works cost of gas into holder. These figures were obtained from the "'Gas World' Analysis of Municipal Accounts, 1927-28," for a number of important English gas authorities. We have the undernoted net cost.

—	Net Cost into Holder per 1000 C.Ft.	Calculated Cost per Therm.
	d.	d.
Birmingham	15·79	3·32
Blackburn	17·77	3·94
Bolton	14·95	2·99
Bradford	22·40	4·48
Coventry	19·63	4·08
Darlington	15·13	3·20
Leeds	18·60	4·08
Leicester	16·10	3·58
Manchester	13·80	3·06
Nottingham	14·33	3·01
Average	16·85	3·57

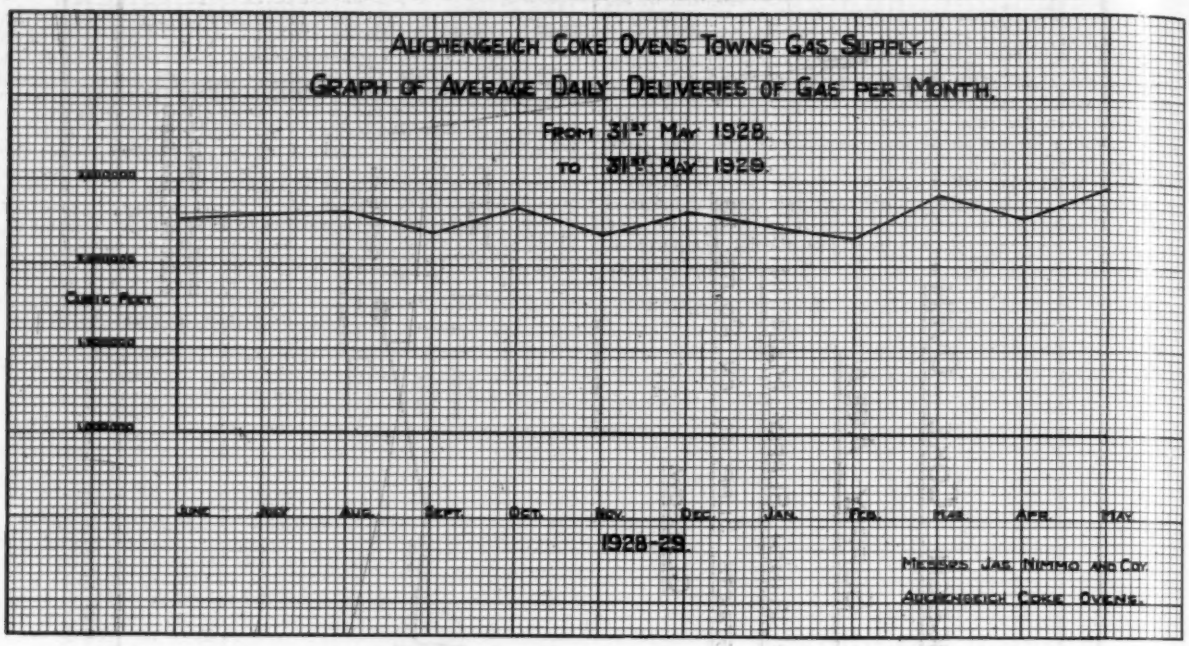


FIG. 4.—DELIVERY CHART OF COKE OVEN GAS SUPPLY IN SCOTLAND, 1928-1929.

In the figures on p. 619 the effect on cost due to rates, taxes, and insurance is not shown, which if included would increase the cost by approximately 2d. to 3d. per 1000 c.ft. Coke oven gas can be supplied below this figure, but it is difficult to understand why offers of 6d. to 7d. should be made by gas authorities—a price which can hardly be considered reasonable in the light of the above manufacturing costs.

Coke Oven Gas Supply Abroad.

As I have already stated, the progress in the bye-product coking industry abroad—particularly in America and Germany—has been more rapid than in this country. The result of this progress, as far as gas is concerned, was that America speedily grappled with the problem of coke oven gas for town supply. Large coking units of the latest design were constructed, and the surplus gas was utilized for steel production and by the gas authorities for distribution to the public. In this connection there is a point worthy of consideration by the gas authorities in this country. In America the gas authorities are very keen to maintain their position as sole distributors to the public; and when they can obtain a supply in bulk from coking plants at a reasonable price, long contracts are entered into. The quantity of coke oven gas distributed in 1926 in this way in America was 90,000 million c.ft.

In Germany the coal and coking industry has been suffering for some time from the severe depression caused by the lack of demand for coal, which has been common throughout the world. Over-production resulted, which has led the principals of the German coal industry to re-organize their whole system of coal disposal, and to devise extensive carbonization schemes for the utilization of their coal—a plan which is greatly required in this country, and which is bound to develop in the next few years if the British coal industry is going to get itself out of the depths of depression into which it has now fallen. The coal carbonization schemes in Germany are far too extensive for me to describe here, but in a general way their object is for large grouping of coal interests with central coking plants, providing coke for steel production and gas for industrial, synthetic chemical, and town use. You will realize the extensive nature of these schemes when it is understood that the German organization Kohleverwertung has made plans for the distribution of 315,000 million c.ft. of surplus coke oven gas in the Ruhr, and it is their intention to carry the distribution system over long distances throughout Germany. It is stated that by the end of 1929 about 650 km. of pipeline for this purpose will have been laid.

The Effect Coke Oven Gas will Have on the Price of Town Gas to the Public.

When the Area Gas Supply Committee was formed many prominent officials of the gas industry expressed their favourable approval of the need for investigation of this important subject. Doubts were expressed, however, as to whether the purchase of bulk supplies of coke oven gas would make public supply cheaper. I think there is an answer to this if we examine the sale price of gas in Middlesbrough and Sheffield. These two cities are the largest consumers of coke oven gas, and the sale price of gas for the year 1928 was 4·4d. and 6·6d. per therm respectively. Without discussing the advantage in cost that can be obtained by the manufacture of gas in large coking units alongside collieries, and the subsequent benefit to our coal and iron and steel industries, there is one very important effect upon the cost of gas—and that is the saving in transport charges for coal alone. The average in railway carriage for screened gas coals for a distance of about twenty miles is approximately 3s. 6d. per ton.

Coke Oven Gas Supply Schemes in Great Britain.

The largest quantity of surplus coke oven gas manufactured in Great Britain is obtained at the moment from the colliery areas of Yorkshire and the Midlands. Supplies are also obtained to a lesser extent in Scotland and Wales. The following is a list of some of the most important undertakings purchasing coke oven gas: Sheffield, Middlesbrough, Glasgow, Leeds, Chesterfield, Newcastle-on-Tyne, Pontypridd, and Rhymney and Aber Gas Company.

In Scotland, coke oven gas has been taken for public service since the year 1925. The supply is obtained from a modern battery of coke ovens erected at the Auchengeich Colliery, situated about six miles to the east of the City of Glasgow. The gas is sold on contract arranged with the Glasgow Corporation Gas Department, and is supplied purified, the volume and calorific value also being guaranteed. This being the case, the 18-in. gas main laid by the purchasing undertaking from the Provan Gas-Works to the coke oven plant serves as a feeder to the outlying eastern area of the Glasgow Corporation supply. The gas that is not consumed in the district is sent forward to the Provan Gas-Works holders, and is delivered with their own gas to other districts of the city. An outline sketch of the position of the gas main shows the districts through which the main is passing and the districts directly supplied—namely, Chryston, Muirhead, Gartcosh, Stepps, and Millerston. The total population of the combined districts is about 16,000. The area through which the main is passing is developing rapidly, and, with the extension of housing schemes and industrial activity on the eastern boundary of Glasgow, there is reason to believe that the total number of gas consumers will increase still further.

Quality of Gas Supplied.

The calorific value of the gas as specified is 480 B.Th.U. gross, and the averages of the Gas Examiners' tests for the last three years are as follows:

Tests of Official Gas Referees on Auchengeich Coke Oven Gas Supply.

Tests at Coke Ovens. Cal. Value. B.Th.U. Gross.	Tests at Gas-Works. Cal. Value. B.Th.U. Gross.	No. of Days on which Sulphuretted Hydrogen was Present.
489·2	491·7	Nil

The total number of testings per quarter was not less than six at the coke ovens and thirteen at the Provan Gas-Works.

The volume of gas delivered initially was approximately 1¼ million c.ft. per day, and this quantity was increased by an extension of the works in 1928 to over 2 million c.ft. per day, and the delivery of gas for the year ended May 31, 1929, was 843 million c.ft. The delivery chart shows the average daily volume of gas supplied per month for the year ended May 31 last.

The coke oven gas supply in Scotland is therefore one of the largest schemes for the supply of purified town gas from coke ovens now in existence in Great Britain, and is almost as large as that of Middlesbrough where the whole town is supplied with coke oven gas, and the annual consumption is about 1000 million c.ft. Large quantities of unpurified coke oven gas are, however, taken by many authorities; the largest purchasing undertaking in this case being that of Sheffield, where about 90 p.ct. of the city's requirements are obtained from coke ovens. There is reason to believe that in Scotland the supply of coke oven gas has been entirely satisfactory. No serious complaints have arisen either from the distribution department or the Provan Gas-Works of the Glasgow Corporation; and they were consequently agreeable to increase the supply figure in 1928 to a minimum of 2 million c.ft. per day.

Co-ordination of the Coking and the Gas Industries.

It is very gratifying to read the remarks of your President, Mr. J. W. Napier, on the above subject of the co-ordination of the two industries, in his Presidential Address to your Association this year; and it is hoped that the same feeling will extend to other prominent officials of the gas and the coking industries. There is no reason for the gas authorities to become perturbed by the overtures of the bye-product coking industry for the disposal of surplus coke oven gas. It is not the intention of the coking industry to take the business of gas supply into their own hands, but rather to co-ordinate the work of the two industries for their common weal, and to provide a gaseous fuel which can be offered at cheaper rates to the public. If this can be done in areas where coke oven gas can be made available, the gas authorities, as the trustees of the public gas supply, are bound to give the question their favourable consideration. The gas authorities should at all times remain the sole distributors to the public, and upon them will rest the full responsibility for the supply. Suitable arrangements and guarantees can be obtained from the coking industry to ensure regular deliveries of gas of a specified quality, purity, and calorific value.

Discussion.

Mr. George Braidwood (Coatbridge) assured the author the members present were much interested in the subject, and in the manner in which it had been dealt in the paper. The position that the coke oven industry found itself in to-day was very aptly stated by the author when he said: "It is almost correct to say that without an outlet for surplus coke oven gas the expense involved in erecting modern coke oven plant is hardly warranted." This meant that the coke oven industry must find a market for its surplus gas; and as this was of a quality similar to that of town gas, it naturally looked to the gas industry to take it. The author had indicated why he thought the gas industry would benefit by taking this surplus gas. On this point there were some in the gas industry who were of opinion that coke oven gas could only be a benefit to that industry if it could be obtained at a price which would result in lower selling charges to the public. The position was therefore clear, and the question was, What is a fair price for coke oven gas? It was suggested by the author that the price should have some relation to the published net cost into the holder, over a period of four to five years, of the gas made by the undertaking proposing to take the supply. If the gas industry, however, agreed to this method, the public would derive no benefit in the way of reduced gas rates, as the gas undertaking would be in exactly the same position financially as it was before it took over the coke oven supply. Mr. Dickie did not think a price of 1·26d. to 1·47d. per therm offered by certain gas authorities was a reasonable one for coke oven gas, and he quoted, to establish that point, the net cost into the holder of ten English gas undertakings in 1928. The figure for these undertakings was shown to be 3·57d. per therm. The author, however, had made an unfortunate choice, as the undertakings mentioned were municipal, and therefore non-profit earning. Had he pursued his inquiries further, and consulted the accounts of the companies for 1928, he would have found that a Scottish company showed a net cost into the holder of 1·67d. per therm, or an average for four years—leaving out 1926—of 1·51d. per therm. Obviously a price even of 1·5d. per therm *plus* the interest on the cost of a main from the coke oven would not attract that Company. Sheffield, on the other hand, which purchased in 1928 11,141,680 therms of coke oven gas, showed a net cost into the holder of 2·27d. per therm. It would therefore appear that a standard price for coke oven gas could not very well be arrived at. The author found it difficult to understand why a standard commodity like gas should vary so much in quality, and pointed out that where gas grids were concerned a standard calorific value would require to be set. He was right as far as grids were concerned, but there was no reason why individual undertakings should adopt a standard quality. The different types of carbonizing plant in use made a standard for the country impossible, even if such were desirable. It must not be overlooked that in 1920, after years of effort, the Gas Regulation Act was introduced by which the industry obtained powers and freedom to sell gas of any reasonable calorific value. Due regard to local circumstances and markets could thus be given when fixing the quality of the gas; and this was a freedom which he thought the gas industry would not lightly forego. At the present time, with low residual values, it was doubtful if the manufacture of 500 B.Th.U. gas was an economic proposition for most gas undertakings. The guarantees with regard to quality and supply which the coke oven industry was prepared to give appeared very satisfactory, but he was a bit doubtful of the ability of that industry to give a supply in time of trouble in the coalfields. In 1926 the supply of coke oven gas fell during the strike period by some 50 p.ct. On the other hand, during that period, gas undertakings were called upon, and did not fail, to supply very greatly increased quantities. There were two or three questions he would like to put to the author. Could he say, for instance, what proportion of Scottish coals was available for the manufacture of metallurgical coke? Could he say if the gas debenzolized at the coke ovens was free from the danger of naphthalene troubles; and could guarantees be given as to its naphthalene content? Coke oven gas was being bought in increasing quantities by individual gas undertakings, and there was no doubt that this would continue. In his opinion, however, no hard and fast rule could be laid down for the gas industry as to how, and on what terms, it could purchase this coke oven gas.

Mr. H. H. Gracie (Edinburgh) agreed with the previous speaker that interest in this subject centred around the price to be paid for the coke oven gas. In his paper Mr. Dickie emphasized that in America large quantities of this gas were purchased at reasonable prices. If the author could tell them what these reasonable prices really were, they might be able to advance a little further in the consideration of the subject. Again, Mr. Dickie cited the case of a gas undertaking which took large quantities of coke oven gas. The sale price was quoted to be 6·6d. per therm, which would amount to approximately 2s. 9d. per 1000 c.ft. From his knowledge of the charges for gas throughout the country, he would say that, given satisfactory conditions, this price could be found by coal gas without any assistance from the coke oven gas industry. Then he noticed that the author made a comparison of the prices paid for coke oven gas with the cost of coal gas into the holder. He did not agree that the year Mr. Dickie had taken could be regarded as a satisfactory year, because, though the coal dispute was finished in 1926, the country was still suffering from the effects of the trouble in the years 1927 and 1928. In the figures which he had given for the cost of gas into the holder, the author seemed to have overlooked the fact that one of the heaviest charges was the cost of maintenance and repair work. This had not been included in the statement, though it was found to continue. To his mind, this was an item from which the gas industry must be entirely relieved if they were purchasing coke oven gas from a company. In a further statement, the author showed that the cost of transport would be something like 3s. 6d. per ton, but to that there would require to be added haulage and handling charges at the gas-works, representing at least another shilling. Of course, this was admittedly a factor where the conditions existing in the different towns had to be fully taken into account. As a precaution a gas undertaking had to provide additional stand-by plant, to guard against an emergency. No guarantee would compensate the consumers for a loss of supply; and therefore the gas undertaking must inevitably provide against the contingency he had mentioned. When the question of the purchase and sale of coke oven gas was under consideration, the matter of the coke itself should also form the basis of negotiation. It seemed to him that, if the coke oven companies were simply going to make coke and to send it out into the districts to compete against the gas industry in those areas, they were all going to be in a worse position at the end of the day than they were at present.

Mr. David Fulton (Helensburgh) said that Mr. Dickie seemed to suspect, on the part of gas engineers, a certain amount of antagonism against the coke oven industry supplying gas to gas undertakings. There was the danger that gas engineers might look at this subject from a narrow and parochial point of view. All of them, he felt, ought to realize that there was good reason why there should be thorough co-ordination between the coke oven industry and the gas industry. They in the gas industry were conducting a keen fight against their chief competitor—electricity—and an alliance with the coke oven industry, whereby they might have cheap supplies of good gas, meant that they could improve the services to the consumers by giving the latter an equal and possibly a better supply at a lower price. The whole thing seemed to be bound up in the establishment of central supplying stations and the elimination of small uneconomical manufacturing stations. On the question of price, obviously it should not be the highest figure the coke oven gas could obtain. It ought rather to be the lowest price at which the gas could be sold. The more the coke oven gas sold, the better it would be for the coke oven company. They could then naturally produce more coke with, he hoped, advantage to themselves. Works for the most part would be kept at full production; and full production meant economy. He subscribed heartily to the suggestion put forward by Mr. Dickie that there should be a standard quality of gas for all the districts in which coke oven gas was supplied. He thought a standard of 500 B.Th.U. was fair and reasonable.

Mr. J. Campbell (Dunfermline) asked if Mr. Dickie could say whether or not any arrangement had been arrived at in regard to the labour question.

Mr. J. W. McLusky (Glasgow) said he was hopeful of the country's prospects with regard to coke oven gas supply. The contract in which Glasgow was interested had been running very smoothly. The question of cost into the holder was a simple thing. He thought, however, that the author would have been better advised to have taken a large number of corporation undertakings, and so avoided criticism. For instance, if they took Glasgow, which was in the author's own area, the cost into the holder averaged 1s. Now if they gave Mr. Dickie an option of 3d. per 1000 c.ft. for carriage of coal, this would bring the cost to 9d., but Glasgow nevertheless was paying 11d. In such circumstances the author's Company appeared to be well paid for their gas. For 480 B.Th.U., 11d. per 1000 c.ft. was a good figure. The best pre-war year in Glasgow was 1912, and the cost of coal was 11d. per 1000 c.ft. The bye-products revenue

amounted to 9d., leaving a cost to the holder of 2d. Now while the cost of coal had only advanced 30s., actually, owing to better results, it had advanced over 70 p.ct. to the merchant who sold the coal. The value of bye-products had fallen 33 p.ct., leaving them with a cost into the holder that was 300 p.ct. higher. The workmen were not getting anything more than they deserved, but the consumer was paying more. All the advantages in gas manufacture had come from the brains of the gas engineer. No advantage at all had come from the collieries or the coke ovens. The brains of the gas industry had made the industry. Every financial advantage had come from that source. On the question of purification, he would like to say that a coke oven plant in an area of supply ought to purify the gas in that area. A point often discussed was what it cost a gas undertaking to purify crude coke oven gas. This depended on the state of the works. He did think, however, that for their own reputation the coke oven people ought to see to the purification of gas within the areas of their supply.

Mr. DICKIE replied to a few of the points raised in the discussion. Complaint, he noticed, had been made by Mr. Braidwood that he had definitely selected municipal undertakings when giving figures bearing upon the net cost into the holder. The undertakings had been selected in a general way, and, as a matter of fact, Scottish works were definitely excluded, with the idea of not causing too much controversy on the question of price. He took it that the calorific value of Mr. Braidwood's undertaking was round about 470 B.Th.U.; and in that connection he was desirous of pointing out that the works he had enumerated in his paper were selling gas of 500 and 520 B.Th.U. He was in agreement with all that Mr. McLusky had said about the coke oven people purifying the supply. So far as the naphthalene content was concerned, the position in Glasgow was that, in accordance with specification, they must supply coke oven gas free from naphthalene. In regard to continuity of supply, the need for this was fully realized by those in the coking industry. Guarantees were now being given on that score. In large towns and other cities, such as Sheffield, for example, where the demand was for 50 p.ct. of the total requirements, it was recognized by the coke oven companies that the supply must be maintained in all circumstances.

JOHANNESBURG AND ITS GAS-WORKS.

By WALTER T. DUNN, M.I.Mech.E.

The programmes of the British Association for the Advancement of Science are well known the world over; and the syllabus of the arrangements for the Association's recent visit to the Union of South Africa maintained in the fullest degree the tradition established for getting the largest number of engagements into the shortest possible period of time. It has been the writer's privilege and pleasure, as a life member of the Association, to attend some of the meetings of its more recent years of existence, but never at any previous assembly has he experienced such science-cum-social activity as has been his pleasant lot during the progress of the Association's meeting in South Africa. Altogether there were 534 names registered as attending the meeting of the Association.

Notwithstanding the attention demanded from a member by

MR. H. M. TYSOE,
Gas Engineer to the Municipality of Johannesburg.

his Association, the writer managed to devote some of his very limited "leisure" to the pursuit of his ruling passion—gas. He has already given an account of his visit to Mr. H. N. Port, the Gas Engineer at Cape Town (see "JOURNAL" for Aug. 21, p. 400), and now ventures to offer some notes, after a call on Mr. H. M. Tysoe, whom he found hard at work at his desk in his well-appointed office at Johannesburg, where he carries out the duties of Gas Engineer to the municipality of that remarkable town.

THE NEW WORKS.

Before Mr. Tysoe's appointment in 1928, both the gas and electricity interests of Johannesburg were under one direction; but the Corporation, realizing the immense possibilities in developing an efficient and adequate gas service, decided several years ago to dismantle the then existing gas-works, which were situated in the town where the electricity works are also operating, and to build an entirely new works in another part, about two miles out, with an independent gas engineer in charge of them. Mr. H. J. Ibbotson, whom the writer also had the pleasure of seeing in his office at Johannesburg, was commissioned by the Corporation, as Consulting Engineer, to draw up the first report on the question of suitability of site, and general lay-out of the proposed new works; but his plans, through unforeseen circumstances, were not proceeded with, though the site which he surveyed was subsequently acquired and the present works erected upon it.

A full description of the works appeared in the "JOURNAL" for April 10 last, so that it is not necessary to recapitulate the particulars which were then given. It will be remembered that the type of carbonizing plant adopted was the Glover-West. The latest improvements were introduced into the installation, and Mr. Tysoe had the advantage of watching the plant go up from the foundations. Various modifications were given effect to as the work proceeded. Mr. W. R. Herring, M.Inst.C.E., acted as Consulting Engineer to the Corporation; and, taking a general view of the works as a whole, it is evident that the design and working arrangements give prospects of unquestionable success in the future, when the development of the outskirts of the town has advanced. Building is going on in all directions, and Mr. Tysoe has his eye on the opportunities thus afforded for establishing a greatly extended clientele. Naturally, with a new works which have cost £168,000, there are considerable charges for interest on capital and for depreciation. There are also sums of money which have to be provided for extending the mains. These are all of steel, with the joints welded by the oxy-acetylene process.

"ACCOUNTED-FOR GAS."

At Johannesburg the phrase "unaccounted-for gas" is not used. There, "accounted-for gas" is the term employed, and, after all, it appeals to one as being more vital; it is what the works are built to supply. The figures then for accounted-for gas, which apply to the last three yearly periods, terminating on March 31 each year, are as follows:

Year 1926–1927	96·1 p.ct.
,, 1927–1928	95·1 ,,
,, 1928–1929	92·9 ,,

The reduction of the last scheduled year is due to the additional mileage of new mains which have been laid (8 miles), leakage taking place during the process. As to the annual make of gas the figures are as follows:

For the year 1920	72 million c.ft.
,, ,, ,, 1929	135 ,, ,,
,, ,, ,, 1930 (estimated)	180 ,, ,,

Mr. Tysoe is not able to do much in the public lighting way at present. There are, however, 75 lamps going, and it is hoped that the number will be increased in due time. The load is 75 p.ct. industrial, gas being used in bakeries, brass foundries, steel pressing works, nut and bolt factories, tin foil factories, and in garages. Coke is in great demand, 16 tons per day being sold at 45s. per ton; 30s. on the works.

Coal costs 22s. per ton and comes from Witbank, 80 miles away. The wagons are of 50-ton or 35-ton capacity. The coal is not considered to be good gas making material; it contains 30 p.ct. of volatiles; 10 to 12 p.ct. ash; and calorific value 13·5 B.Th.U. per lb. The make is 77·5 therms per ton, and the calorific value of the gas 470 B.Th.U. There is no legislation requiring the undertaking to maintain a constant value and pressure, but, in the interests of the concern, great attention is paid to sending out gas of uniform quality; the satisfaction of the consumers is thereby established and maintained. A re-

cording calorimeter supplied by Alexander Wright & Co. is used in that connection.

PRICE OF GAS.

The price of gas cannot be changed without an order of the Administrator of the Province of the Transvaal, in which Department of the Union the works are placed. The scale of charges are based on the following schedule:

For the first	25,000 c.ft.	6s.	per 1000
,, ,, second	,, ,, ...	5s.	,, ,,
,, ,, third	,, ,, ...	4s. 6d.	,, ,,
,, ,, fourth	,, ,, ,, ...	4s.	,, ,,

above 100,000 the price is 3s. 6d. per 1000 c.ft.

It is intended to try coal from the Natal Navigation Collieries, which are 300 miles away, at a price of 18s. 4d. per ton. The cost of transport is enormous, however, and militates against selling gas at a popular price. As an indication of this, it may be said that it costs more to transport goods from Cape Town to Johannesburg than from England to Cape Town.

There is an import duty of 20 p.ct. on gas cookers, and one of only 15 p.ct. on electric cookers. This is obviously unjust, and is handicapping the gas industry. Mr. Beyers, the Minister of Mines and Industries, has the matter in hand, and it is hoped that the legislature will have the matter rectified. The municipality are not permitted to sell any goods to gas consumers, and consequently no showrooms are provided. A list of some fifteen traders who can be recommended to supply satisfactory gas appliances is kept by the Department, and the would-be consumer makes his selection from it. The workmen of the undertaking must not go past the meter in any work they may be engaged upon. There are a number of cookers of German manufacture to be obtained, and one could not help coming to the conviction that British manufacturers would be well advised to have a good live representative on the spot, so that the advantages of their goods could be explained. Business is sure to follow; the personal touch is needed.

DISTRIBUTION AND STORAGE.

About 44 miles of mains are already laid, and main-laying is going on fast; they are principally of 24 in. diameter. Some are 6 in., which size and above are weld-jointed; those under 6 in. are screw-jointed. Very little cast-iron main is laid, the nature of the ground having a bad effect upon such.

It is interesting to note that the largest meter installed is at a biscuit factory (the Premier Biscuit Factory), and records at the rate of 3000 c.ft. per hour. These works consume 400,000 c.ft. per month. With gas at 3s. 6d. per 1000 c.ft. and coal at 24s. per ton, it is found that gas is slightly more expensive than coal; but the collateral advantages of gas give it preference. It can easily be adjusted, and the grades of temperature so essential in biscuit making can be attained with great precision.

The storage at Johannesburg consists of two holders, each of half-a-million c.ft. They were supplied and erected by Messrs. C. & W. Walker, Ltd. The purification is done by means of iron borings obtained from the electricity works of the Corporation, which would otherwise go practically to waste. They are strewn in the open air and weathered so as to rust; mixed with sawdust an excellent and inexpensive purifying material is made available. There is no local market for sulphate of ammonia, and consequently the effluent is not utilized. The price of sulphate on the coast is £10 10s. per ton; acid costs £18 per ton; the situation will thus readily be recognized.

BYE-PRODUCTS.

The tar produced at the works is distilled in a plant which has been devised by Mr. Tysoe's assistant; and it is working well. Benzole is obtained with which the two motor lorries belonging to the Gas Department are driven. Oils for treating the sanitary buckets are also given off. The British Standard Specification for Tar is observed, and a good road-making material is produced; the method being to mix the aggregate with the tar as it comes off, instead of spreading the tar on the road after the material has been laid.

Water is dear at Johannesburg, all being paid for through meters. At the gas-works, therefore, care is taken to conserve all that is required in the various parts of the premises. Two large cooling ponds have been laid down, with cooling towers above. By this means a satisfactory water supply at an economic price has been assured. There is one waste-heat boiler, and one Lancashire, the latter being fired by the breeze from the coal receiving plant, &c.; forced and induced draught are employed.

The writer went all over the works under the escort of Mr. Tysoe and his assistant, and was impressed by the atmosphere which revealed itself throughout the couple of hours he was in their company. Johannesburg, no doubt, will give a good account of itself, and its progress will be watched with sympathy and interest by all gas engineers in the Old Country.

INDUSTRIAL GAS APPLICATIONS.

From the "American Gas Journal."

GLASS MIRROR MANUFACTURE.

Gas is an important aid in the manufacture of high grade glass mirrors, being used both directly and indirectly in the various operations. One of the essential conditions in the manufacture of this article is the availability of a steady supply of distilled water which is used in chemically cleaning the surface of the glass before the silvering solution is applied. The gas steam boiler is ideal equipment for obtaining a steady supply of distilled water.

The automatic operation of this apparatus through the use of a thermostat is an important feature in the attainment of a steady supply of distilled water. Another important advantage of gas is that the distilled water apparatus can be located close to the point where the actual operation of silvering is carried out.

The direct use of gas in the process of making mirrors is in heating the silvering table which must be kept at a temperature of 90° to 100° Fahr. The uniformity of this temperature, not only throughout the duration of the process but also all over the table, is essential.

ROASTING COFFEE.

Before gas was used for the purpose, coffee was roasted in drums heated by coke or coal. Great difficulties were encountered in this process, and it was only the most experienced operator that could turn out a properly and uniformly roasted coffee. For this man had to know how to build the coal or coke fire, to keep them properly trimmed and to control them, besides how to adjust his roasting process to the peculiar properties of the coffee that was being treated, for not all coffees can be roasted at the same temperature.

When gas entered this field, the operator was enabled to pay more attention to the quality of coffee under treatment and less to the maintenance of the temperature within the roaster. Moreover, even though gas is more expensive, being a quality fuel, the total cost of the operation was found to be less, due to the avoidance of burnt coffee and the reduction in the labour cost of tending the roasters.

The ease with which the gas flow can be controlled and the proper temperature thermostatically maintained within the roasters enable the operator to give more attention to the quality of the coffee that he is producing. The automatic feature of the operation is so well-developed that the operator can start the apparatus and proceed to another without any necessity of paying any more attention to the first roaster.

The dirt, dust, ashes, and general uncleanliness which surrounded the coffee roasting process when coal or coke was used as a fuel are entirely absent when gas is employed. There was always danger that the coffee would be spoiled by coming into contact with this dirt in the old roasting process, and furthermore, there was the additional danger that the fumes and smoke developed when solid fuels were used would spoil the product, giving it a bad odour. These conditions are non-existent when gas is employed. Other advantages of gas in this operation are that it does not occupy valuable space as does the coal or coke pile. Further, the production of the apparatus is much greater per unit of time.

All these advantages more than compensate the higher per unit cost of the gaseous fuel. Nevertheless, careful experiments have shown that the average consumption of gaseous fuel of the ordinary B.Th.U. value for roasting one pound of green coffee was 0·0626 c.ft. The gas roasting process has really been primarily responsible for the fine aroma and high quality of the coffee of to-day.

Ignition of Firedamp.—When dealing with a matter which is the subject of constant research, both in this and other coal-producing countries, it becomes essential that the results of earlier work be reviewed from time to time in the light of new data and the old interpretations confirmed or revised. "The Ignition of Firedamp" is a subject of this nature, and in the Paper under that title just issued by the Safety in Mines Research Board (Paper No. 53, H.M. Stationery Office, price 6d. net) the information given in Paper No. 8 of 1925 has been revised and supplemented. The Paper summarizes present knowledge as to the conditions under which various forms of heat application (compression, contact with flames, electric discharge, friction, &c.) reach the combined intensity and duration necessary to cause ignition of the various inflammable mixtures of firedamp and air.

SHIPPING ENGINEERING AND MACHINERY EXHIBITION.

Appeal both Technical and Popular.

This year's Shipping Engineering and Machinery Exhibition at Olympia, the tenth of a series that has been arranged since 1906, is the biggest and most comprehensive yet held. It is under the patronage of the British Engineers' Association, the Society of Motor Manufacturers and Traders, and the Marine Oil Engine Manufacturers' Association, and comprises the displays of 325 firms, representing every branch of marine and general engineering with their ancillary interests. It was opened officially by the Duke of Northumberland on Sept. 12, and will continue till Sept. 28. During the sixteen days it is open forty-seven different associations connected with the engineering and shipping industries are paying official visits to the exhibition. Yesterday the Institution of Gas Engineers inspected the exhibits, and to-day the London and Southern District Junior Gas Association will be present.

While in the past the exhibition has been almost entirely of technical interest, this year an appeal is being made to the man in the street. Displays specially arranged to make difficult problems clear explain some of the recent marvels accomplished by marine engineers. Though shipping occupies the major part of the exhibition, general engineering is by no means ignored. Exhibits in this section range from a cream that will render the engineer's hands impervious to dirt to a flame that will cut through 15-in. steel. In what follows we describe in brief those exhibits which are likely to be of interest to our readers.

Miscellaneous Engineering Exhibits.

We will deal first of all with what may be termed heavy engineering exhibits. The "Turbine" furnace manufactured by the Turbine Furnace Company, Ltd., of 238B, Grays Inn Road, London, W.C. 1, is well known to gas engineers; but they will doubtless be interested in the smoke bridge shown and now supplied as a standard fitting with the "Turbine" furnace to Lancashire and Cornish boilers. The manufacturers claim that by its use the advantages of freedom from smoke and elimination of brickwork are gained. The bridge is easily installed, non-choking, and fool-proof. The "Turnat" furnace will also be of great interest.

Messrs. Stothert & Pitt, Ltd., of Bath, are showing many examples of their rotary displacement pumps. An important feature of this exhibit is the design of pump which has been developed for such duties as forced lubrication; the pump being suitable for direct coupling to an electric motor or engine without the use of gear transmission.

Of interest on the stand of Messrs. Ruston & Hornsby, Ltd., of Lincoln, is an airless injection oil engine for generating electricity. This is a 200 kilowatt set, and starting is effected instantly from cold by compressed air. Another oil engine which will doubtless attract attention is to be found on the stand of Messrs. Crossley Bros., of Openshaw. This is of the enclosed horizontal type with a normal rating of 80 B.H.P. at 350 R.P.M. Pump lubrication is supplied to the moving parts. On the stand of Messrs. Davey, Paxman, & Co., Ltd., of Colchester, is a 340 to 376 B.H.P. heavy oil engine running at a speed of 330 R.P.M. The injection of the fuel is on the Blackstone patent "Spring Injection" system, and the design embodies the Paxman patent eccentric operated exhaust valve gear, with forced lubrication throughout. The engine is shown running under its own power on ordinary fuel, and is stopped and started to show the simplicity of this operation. Also exhibited by this firm is a 3-section, size "O," Paxman patent all-steel sectional hot water boiler. This type of boiler offers many advantages. Being manufactured of mild steel plates, the risk of fracture is avoided, and at the same time the life of the boiler is increased. It is built up on the multiple unit system; each section is self-contained, there being no water joints to make a leak between them. The front and back sections are water cased, and the gases actually pass three times along the length of the boiler, which has a double return flue, thereby affecting a very considerable economy in fuel.

The Bennis forced draught carrier bar type chain-grate stoker with multiple air control arranged for either preheated or normal atmospheric air supply is to be found on the stand of Messrs. Edward Bennis & Co., Ltd., of Bolton, which firm also has a working exhibit of the "Bennis" smokeless and gritless coking stoker, with natural draught furnace as applied to a single-flued Davey Paxman "Economic" boiler, with independent drives for stoker feed boxes and furnace bars.

Sectional parts of water-tube steam boilers for both marine and land purposes are included in the display of Messrs. Babcock & Wilcox, Ltd., of Farringdon Street, London, E.C., who also show examples of high pressure drum ends and other accessory parts, including headers and superheaters.

The patent "Centricast" process is demonstrated by the Sheepbridge Stokes Centrifugal Castings Co., Ltd., of Chesterfield. "Centricast" is a centrifugally-cast iron suitable for all parts where plain cylindrical castings are required, such as piston ring drums, cylinder liners, sleeve valves, hammer valve tubes, piston valve liners, &c. Castings and finished machined examples of these components are shown, illustrating the type of articles for which these castings are commonly used. Castings are also exhibited partly machined to show the unusually fine machining allowances required, and the absence of surface scale. Fractured castings reveal the exceptionally close grain of "Centricast" iron, which is a factor of its high wearing and heat-resisting qualities.

Boltons Superheater and Pipe Works, Ltd., of Stockport, have an exhibit of great interest to all engineers. This is a patent steam purifier and separator with which the firm guarantee to produce 99·5 p.ct. clean, dry steam, free from moisture and impurities, from any type of boiler, irrespective of the conditions of the boiler feed water or steaming conditions. The apparatus fits in place of the usual anti-priming pipe, can be fitted in a few hours, and no alterations to the boiler or pipework are required.

Measuring and Recording Instruments.

There is a comprehensive display of measuring and recording instruments widely used in gas-works. The Electroflo Meters Company, Ltd., of Park Royal, London, N.W. 10, exhibit a range of modern industrial instruments, including typical "Electroflo" multiple metering systems. A special feature is the new "Electroflo" automatic control pyrometer, which features unusual simplicity and strength. An additional feature of considerable interest is the "Electroflo" motor-driven combined CO_2 indicator and recorder, which retains the essential accuracy of measurement by chemical analysis, but is independent of water, free from glassware and fragile materials, and has all of the driving and measuring mechanism continuously oil immersed. It is operated by a 1/20 H.P., totally-enclosed, ventilated motor, and provides a continuous ink line record on a 12-in. diameter chart, and also indicates the CO_2 percentage on a scale which can be easily read at a considerable distance. The instrument has a caustic capacity permitting six months' operation without attention. "Electroflo" draught indicators, and flow, temperature, and pressure regulators are also exhibited in considerable variety.

On the stand of Messrs. George Kent, Ltd., of Luton, is their combustion efficiency meter, which enables correct firing conditions to be maintained at all loads. Boiler feed meters and steam meters in a variety of patterns for all conditions, and a "Telerecorder" enabling steam flow records to be transmitted to a distance are also shown. A variety of oil meters is exhibited, suitable for measuring all grades of oil, from petrol to oil of high viscosity, and for all sizes of pipelines and conditions of discharge. For gas measurement, the shunt gas meter is suitable for measuring clean or dirty gas in pipelines from 3 in. in diameter upwards. The "Balance" recorder, for giving a diagrammatic record of the flow of gas or air, and the curved tube manometer, for testing, are equally invaluable to the gas engineer. A new instrument in the "Gas Holder Height Indicator" enables the height of the holder to be transmitted electrically to any convenient point.

A most attractive display is staged by the Cambridge Instrument Company, of Grosvenor Place, S.W. 1. Examples of the wide range of instruments manufactured by the firm for the measurement of temperatures are shown, including dial thermometers (vapour-pressure type), mercury-in-glass thermometers, indicating and recording thermometers (mercury-in-steel type), electrical distance thermometers enabling the temperatures at a number of scattered points to be accurately observed on a single instrument placed in the most convenient position, electrical resistance pyrometers, and thermo-electric pyrometers, and a number of portable instruments designed for accurately and rapidly measuring the temperatures of heated surfaces in various industrial applications. An automatic temperature regulator is shown in actual operation.

The Lea Recorder Company, Ltd., of Manchester, feature on their stand the "Cubi" meter for measuring coal in bulk. A complete machine in full operation is shown. Other useful accessories, such as distant-reading indicators, are also on view. The British Pitometer Company, Ltd., of Victoria Street, London, S.W. 1, exhibit "Venturi" recorders of various types for indicating, integrating, and recording the flow of liquid and other fluids; while the thermo-electric pyrometers, suitable for furnace temperature up to 3000° Fahr.,

shown by Messrs. Negretti & Zambra, of Holborn Viaduct, London, E.C. 1, are bound to attract attention.

Finally, in this section, we call attention to the exhibits of the Drayton Regulator and Instrument Company, Ltd., of West Dratyon, who show temperatures and regulators for the control of valves, dampers, &c.; and of the Sarco Company, Ltd., of Long Acre, London, W.C. 2, whose display includes the "Sarco" carbon dioxide recorder, which is too well known among our readers to need any comment here.

Oil Separation and Purification.

The application of modern methods to the purification of oil of all descriptions is admirably demonstrated at the exhibition. So many, indeed, are the various appliances shown that we must be forgiven if inadvertently we have failed to notice some of them.

The Alfa-Laval Company, Ltd., of Grosvenor Road, London, S.W. 1, exhibit the De Laval centrifugal purifiers, which is capable of removing solid matter such as dirt, dust, metallic particles, and any water or moisture from all classes of oils, whether lubricating, fuel, or insulating. A point on which the makers lay great stress is that De Laval purifiers run at comparatively low speed, this being rendered possible by virtue of the disc construction of the bowl, which splits the liquid being purified into thin layers. While this type of design ensures a high degree of purification, the fact of being able to run the machine at low speed means that only small charges are incurred for upkeep, and a high factor of safety can be enjoyed. A special feature of the larger machines, and to which particular attention should be paid, is that they have an enclosed automatic lubrication system, rendering frequent visits to the machine for oiling purposes unnecessary.

Visitors to the stand of Super Centrifugal Engineers, Ltd., of Sharples House, Grosvenor Road, London, S.W. 1, may observe the performance of several types of Sharples oil purifiers and separators in actual operation and under conditions as nearly as possible approaching those of commercial installations. The Sharples "Super-Centrifuge" is of extreme simplicity. It consists of the main cast-iron frame either of the totally enclosed or open type. The top part of this frame accommodates the bearing head, which is arranged for ball bearings, and from which is suspended the spindle and revolving bowl. The bottom of this bowl protrudes downwards and revolves in a guide bushing which is held by a spring in its housing. This spring is so fitted as to permit of a lateral movement which enables the bowl to rotate freely around its own centre of gravity. The bowl, revolving at between 15,000 and 17,000 R.P.M., and being only of approximately $4\frac{1}{2}$ in. diameter and 30 in. long, is not subject to excessive stresses and strains; neither are the bearings subject to rapid wear due to the high revolutions. The peripheral stresses, strains, and speeds of the bearing are comparatively low, having regard to the small diameter of the bowl. The bowl itself weighs only 35 to 37 lbs., and comprises three simple parts. The ease and speed with which the Sharples oil purifier can be cleaned can be gauged from the fact that any type of this apparatus can be shut down, the bowl removed and cleaned, and the machine completely recommissioned within fifteen minutes. The machines are highly suitable for tar dehydration, for which purpose they are extensively employed in gas-works.

Then there is the exhibit of British Separators, Ltd., of York, who demonstrate the application of their machines to the treatment of insulating, lubricating, and fuel oils. These separators should attract the interest and attention of engineers and others responsible for the efficient and reliable performance of power plants. Centrifuges of all sizes and types are shown. Nor ought one to miss the stand of the Stream Line Filter Company, Ltd., of Westminster, S.W. 1, who exhibit a representative range of "Stream Line" oil renovators for reconditioning used oil. All the filters exhibited are constructed on the now well-known streamline principle of edge filtration between paper discs.

Various Welding Processes.

Exhibits of various welding processes are also plentiful. Alloy Welding Processes, Ltd., of Walthamstow, E. 17, have on view ten different types of welding equipment, including their latest design of motor generator set, which will appeal to those who desire a machine of pleasing appearance, light weight, and small dimensions. This firm also show a wide range of electrodes of the "A.W.P." brand, to suit all classes of work, including stainless steel, "Staybrite" steel, high-speed steel, manganese steel, copper, brass, and bronze. Samples of various electrodes, together with welds illustrative of the various classes of work which can be carried out, are shown by the Premier Electric Welding Company, Ltd., of Abbey Wood, London, S.E. 2; while the exhibit of the A.C. Welding Company, of Stratford, E. 15, consists of various types of portable "Alternarc" alternating current arc cutting and welding machines of improved design suitable for use with any welding electrode on the market, whether bare or coated. Both oxy-acetylene and electric welding equipment are demonstrated by Messrs. Allen-Liversidge, Ltd., of Westminster, S.W. 1.

Air Compressing Plant.

Three of the firms exhibiting air and gas compressing plant are Messrs. Reavell & Co., Ltd., of Ipswich, the Rotary Air Compressor Company, Ltd., of Westminster, S.W. 1, and Messrs. Lacy-Hulbert & Co., Ltd., of Croydon. Among the exhibits of the first-named firm are a vertical two-stage compressor for general workshop use, with a capacity of 400 c.ft. of free air per minute for pressures up to 120 lbs. per sq. in.; a "Quadruplex" compressor; a water-cooled "Rotary" compressor; and a sectionalized "Rotary" compressor, showing the working parts. There are also a number of "Rotary" air motors.

The Rotary Air Compressor Company, Ltd., of Westminster, S.W. 1, are showing a range of rotary air compressors and vacuum pumps, which are designed on the well-known crescent principle, but which are provided with patented floating rings which prevent the wear of the blades upon the casing.

"Boreas" high-speed compressors figure largely on the stand of Messrs. Lacy-Hulbert & Co., Ltd., of Croydon. These machines are designed for running at high speed.

Further Exhibits.

To enumerate all the exhibits which the gas engineer will doubtless find interesting would in the space at our disposal be impossible. But mention may be made of one or two. First of all there is the interesting thimble-tube boiler manufactured by the Clarkson Thimble Tube Boiler Company, Ltd., of the Strand, London, W.C. 2, who specialize in the recovery of waste heat from the exhaust gases of two and four stroke Diesel engines, and are showing one of their smallest exhaust gas water heaters. This heater is of the "Hegar" type, in which the hot gases enter at the bottom, rise through the centre tube, then descend through the nest of thimble tubes and so pass out to atmosphere. The construction of the "Hegar" is similar to that of the "Begar" or return flow type of boiler, the only differences being the absence of a steam space and pads for extra boiler mountings on the former. This heater is shown in section; parts of the outer shell, water baffle, inner shell, thimble tubes, and centre core being cut away to show the unique construction of the boiler and the paths taken by the water and exhaust gases.

On the stand of P.I.V. Chain Gears, Ltd., of Westminster, S.W. 1, are to be seen in motion standard types of totally enclosed "P.I.V." (positive infinitely variable) gears of 10, $7\frac{1}{2}$, 5, 3, and 1 H.P., with a speed variation in each case of 4 : 1. Nuts which presumably never come off are shown by Evertite Locknuts, Ltd., of Victoria Street, London, S.W. 1, and Messrs. Vislok, Ltd., and Caxton Wood Turnery Company, of St. Bride's House, E.C. 4. Messrs. Fescol, Ltd., of Grosvenor Road, London, S.W. 1, are showing specimens of electro-chemically deposited parts and materials as used in the engineering industry generally; while Metallisation (Sales), Ltd., of Upper Thames Street, London, E.C. 4, are exhibiting their latest improved metal spraying pistol, by which any metals or alloys of metals that can be drawn into wire can be sprayed instantaneously on to metallic or non-metallic surfaces by the use of compressed air, hydrogen or acetylene, or coal gas and oxygen. In the case of metallic surfaces, all areas must be cleaned by sand blasting first; and in the case of wood, sand blasting is only necessary at lesser pressures, and in some cases by the application of quick drying varnishes or other substitutes. By this process aluminium can be applied to iron and put to a glow forming an alloy for the protection of iron against heat, and for which there is a special patented application known as "alumizing." The principal advantages of this process are the application of zinc against corrosion and aluminium for the protection against heat, and also that all cutting, if necessary, can be done *in situ*.

The Wailes Dove Bitumastic, Ltd., of Newcastle-on-Tyne, are showing their well-known anti-corrosive preparations, including "Bitumastic" solutions, enamels, coverings, and heat-proof cement. Aerostyle, Ltd., of Clerkenwell, E.C. 1, have continuous demonstrations of their paint-spraying machinery for all classes of painting, distempering, whitewashing, and enamelling. On the stand of Film Cooling Towers (1925), Ltd., of Chancery Lane, London, W.C. 2, is seen a model of a patent cooling tower to a scale of 1 in. to 1 ft., capable of cooling 250,000 gallons of water per hour. A wide selection of trucks, ladders, and barrows is shown by Messrs. H. C. Slingsby, of Kingsway, London, W.C. 2; while the Soldo Company, of Southampton Row, London, W.C. 1, exhibit "Soldo" patent tinning compound, which, described in the "JOURNAL" a short time ago, consists of a combination of non-acid fluxes and metal, and is guaranteed to be free from lead and mercury. By the mere application of "Soldo" and heat alone all metals, except aluminium, can be easily and effectively tinned without any previous preparation whatsoever. "Soldo" has been tested and approved by the National Physical Laboratory.

In terminating this brief description of what must be considered in all quarters an exhibition of first-rate interest, we may mention the attractive display of Electrolux, Ltd., of Regent Street, London, W. 1, who, in addition to featuring the well-known "Electrolux" refrigerator, show the "New Electrolux" water softener, which employs the base exchange method.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Gas Lighting Service Bureau.

SIR,—An article appeared last week in one of your contemporaries advocating the formation of a Gas Lighting Service Bureau.

As manufacturers interested in the gas lighting field, we should cordially welcome the formation of a Gas Lighting Service Bureau such as is suggested; and we believe that all branches of the gas industry would reap a great and lasting benefit from such a department. It is not our suggestion to depreciate, or interfere with in any way, the very valuable work done by the British Commercial Gas Association, but rather to co-operate with them in a similar way to the Lighting Service Bureau of the Electric Lamp Manufacturers' Association and of the Electric Development Association—the body corresponding to the "B.C.G.A."

Such a Bureau would be entirely at the service of every gas undertaking to help them to retain their lighting load (public and private), and the research department would be constantly exploring future possibilities of gas lighting and placing this knowledge at the disposal of manufacturers and gas undertakings. The Electric Lighting Service Bureau is very valuable—surely the gas lighting industry needs some organization to meet this.

If all those interested—gas engineers, manufacturers, and suppliers of fittings—get together, an active body could soon be formed. In fact, if prompt action is taken, some plans could no doubt be put before the "B.C.G.A." Conference at Eastbourne to lay the foundation of joint amicable working.

We have taken the liberty of asking the good offices of the Editor of the "JOURNAL" to receive any letters from manufacturers, suppliers, and engineers who would welcome a preliminary meeting to discuss the practicability of the suggestion. If those interested would be good enough to write to the Editor, endorsing the envelope "Gas Lighting Service Bureau," their communications will be forwarded to the writer, and a preliminary meeting will be arranged in London or other suitable place within the next week or two.

"LIGHTER SIDE."

Sept. 9, 1929.

Purification of Coal Gas.

SIR,—I desire to avail myself of the opportunity afforded through your esteemed journal to express my appreciation of Mr. Cooper's authoritative and instructive dissertation on the "Purification of Coal Gas" which appeared in your issue of Sept. 26, 1928. I have perused the contribution with great interest, more especially that section which deals with cooling and condensation in which reference is made to the data advanced in my paper on this subject.* It would appear, however, from Mr. Cooper's endeavours to make comparisons between the data determined by his Committee and that resulting from the work conducted by the Australian Gas Light Company, that some misunderstanding has arisen regarding the precise nature of the respective coefficients.

Reference is made by Mr. Cooper to the copy of the paper printed in the "Gas Age-Record" of Feb. 11, 1928. It is possible that had he also read the copy of the paper printed in the "JOURNAL" for Feb. 8, 1928, certain additional information would thus have been obtained from the graphs which were given in the "JOURNAL" and not in the "Gas Age-Record," and the comments made by him, as a consequence, may have been modified. In the circumstances it behoves me to add a few remarks which may assist in removing the misapprehension that apparently exists.

The coefficients of heat transmission advanced by Mr. Cooper for various ranges of temperatures are unfortunately of a total or over-all nature, representing, as they do, the combined effect or resultant of a number of separate resistances to the passage of heat which are arranged in series in the following order:

(1) The resistance due to the gaseous film which normally constitutes the major obstruction to the flow of heat.
(2) The resistance due to the metal wall of the condenser tube, which is very slight and in practice is negligible.
(3) The resistance due to rust deposits, protective coatings, paint, &c., on the surface of the condenser tube.
(4) The resistance due to the quiescent film of water, which varies largely with the velocity of flow past the tube surface.

It is obvious that data of an over-all nature are necessarily limited in their sphere of application to the particular set of conditions (such as velocity, temperature range, and degree of saturation of the gas, the nature of the tube walls, drainage of the condensate, velocity of the cooling water past the tube surface, &c.), which prevailed during the conduct of the original tests. Mr. Cooper has apparently failed to mention some of these factors, and has inadequately described others. From the foregoing remarks it will be appreciated that any attempt to compare over-all coefficients, the components of which are not fully described, is manifestly unsatisfactory, and may lead to erroneous conclusions.

In view of the multiplicity of widely divergent conditions which exist in practice, it is obviously necessary to reduce all data obtained by the various investigators in this field of research to a common basis before any comparison between them may logically be made. The data obtained from the research undertaken by the Australian Gas Light Company are expressed in terms of the *condensing gas film coefficient* only, which, taken in conjunction with the other coefficients (the data for which are available from various sources), enables the designer to forecast accurately the heat transmitting capacity of any condenser, under widely varying conditions.

While Mr. Cooper has recognized the effect of velocity of flow of gas through the condenser tube on the value of the over-all coefficient, he has, however, apparently failed to take cognisance of his work of the function of the diameter of the condenser tube. The internal diameter of the tube is of fundamental importance in determining the degree of turbulence. As the gas film coefficient is a function of turbulency, the significance of the diameter of the tube is therefore obvious. This fact has been recognized by Reynolds and other investigators on heat transmission and fluid friction. The function of the tube diameter in heat transference has been deduced by Mr. C. C. Challis, of the Australian Gas Light Company's staff, from purely dimensional considerations in the following manner:

Since the conductance of a fluid film varies inversely as its thickness, which is in turn dependent upon the density S, viscosity U, and mean velocity of flow V, of the fluid and the diameter of the condenser tube D, it follows (by the simple assumption that each of these factors obeys an exponential relationship) that the film coefficient

$$k_g = \frac{K_g}{S^a U^b D^c V^n} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where k_g denotes the specific conductivity of the condensing gas, the value of which is dependent upon the temperature range and the degree of saturation.

The influence of the various factors concerned in the rate of heat transmission through a fluid film has been shown by Buckingham[†] to depend upon fundamental dimensions of mass m, length L, and time θ, which obviously must enter to the same power in the case of any two quantities that may be equated one to the other.

By applying the fundamental dimensions of the physical quantities involved we have:

Thickness measured by the dimension	. .	L
Viscosity	,, ,, ,,	$\frac{m}{L\theta}$
Density	,, ,, ,,	$\frac{m}{Vol} = \frac{m}{L^3}$
Velocity	,, ,, ,,	$\frac{L}{\theta}$
Diameter	,, ,, ,,	L

By substituting these dimensions in equation (1) we obtain the following relationships:

$$k_g \propto \frac{1}{L}$$

but $\frac{1}{L} \propto \left(\frac{m}{L^3}\right)^a \left(\frac{m}{L\theta}\right)^b L^c \left(\frac{L}{\theta}\right)^n$, which, when simplified, gives:

$$L^{-1} \propto m^{a+b} L^{-3a-b+c+n} \theta^{-b-n} \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

Since each dimension must necessarily enter to the same power on both sides of any equation, we obtain, by equating to zero, the following relationships:

(i) From a consideration of the mass relationship it follows that:

$$a + b = 0, \text{ whence } a = -b$$

(ii) Similarly, from the dimension of time we obtain the equation:

$$-b - n = 0, \text{ from which } n = -b$$

(iii) From the consideration of the third dimension—viz., length—we have:

$$c + n - b - 3a + 1 = 0$$

from which it follows that:

$$c = 3a + b - n - 1 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

Since from physical considerations we know that the film thickness decreases with increasing velocity of flow, it is desirable to reduce the exponents a, b, and c used in equation (1) in terms of the exponent of the velocity of flow—viz., n. It has been shown that $a = n$, and that $b = -n$, whence it follows, by substituting in equation (3), that:

$$c = 3n - n - n - 1 = n - 1$$

Now, substituting for a, b, and c in equation (1), we have:

$$k_g = \frac{K_g}{\text{film thickness}} = K_g \left(\frac{SV}{U}\right)^n D^{n-1} \quad . \quad . \quad . \quad (4)$$

It should be noted that equation (4) is a logical one—since all the dimensions cancel. The relationship has, however, been deduced on the assumption that the tube surfaces are perfectly smooth—a

* "Gas Age-Record," Feb. 11, 1928.

† Phys. Rev. 4 (1914), p. 345, also Trans. Am. Soc. Mech. Eng. 37 (1915), p. 263, J. Washington Acad. Sci. 4 (1921) p. 347.

condition which is only approximated in practice. Consequently it is necessary to introduce a factor C, as suggested by McAdams and Frost,* to allow for the added resistance to the passage of heat caused by the entrapped stagnant fluid as the result of the roughened tube surface.

$$k_g' = C k_g \left(\frac{VS}{U}\right)^n D^{\overline{n-1}} \quad . \quad . \quad . \quad . \quad . \quad . \quad (5)$$

The effect of diameter on the coefficient of heat transmission of fluid films may be summarized as follows:

$$k_g \propto D^{\overline{n-1}} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (6)$$

It is not deemed expedient to enter further into the mathematical treatment of experimental data at this juncture, but it is hoped to do justice to this fundamentally important branch of research in an article describing the data obtained from a research on gas condensation conducted by the Australian Gas Light Company, which will be contributed to the "JOURNAL" in the near future.

In conclusion, I desire to direct attention to the similarity of the deductions made by Mr. Cooper and myself in regard to the effect of velocity of gas flow on the coefficient of heat transmission. The values of the coefficients were found by our respective investigations to be proportional to the 0·76 and to the 0·77 power of the mean gas velocity; these results being to all intents and purposes identical.

H. TINDALE,
Engineer for Works.

The Australian Gas Light Company,
Sydney, July 30, 1929.

* Journal Ind. and Eng. Chem., Vol. 16 (1924), pp. 460-7.

REGISTER OF PATENTS.

Gas Radiators of the Closed Fluid Type. No. 297,080.

MOSER, A. D., of Mosman, New South Wales.

No. 15,703; May 29, 1928. Convention date, Sept. 14, 1927.

This invention relates to radiators of the type in which a limited quantity of water enclosed therein is heated by a gas furnace incorporated in the structure, the steam generated being contained in the apparatus. Tubular unit sections of cast iron are united and held assembled by pressed-in tubular thimbles of wrought steel; a gas furnace chamber being formed in the lower portion of the radiator by integral extensions of the tubulous upper part of the sections. The invention also comprises a pressure controlled automatic valve to supply gas to the burner located in the furnace chamber, and also devices for the purpose of evacuating air, for breaking the vacuum when the apparatus is allowed to go cold, and for relieving over pressure which may result from accidental overheating.

Gas Switch.—No. 316,923.

SOUTH METROPOLITAN GAS COMPANY and SMITH, J. H., both of Old Kent Road, S.E. 15.

No. 13,296; May 5, 1928.

This invention relates to electric ignition apparatus for incandescent gas burners. The ignition apparatus comprises a switch having a body containing mercury and formed with two compartments in each of which is located a contact, the compartments being placed in communication with one another by a restricted orifice or orifices. The invention is illustrated in the accompanying diagram, in which fig. 1 is an elevation, fig. 2 an end elevation partly in section, and figs. 3 to 6 detail views; figs. 3 and 4 showing the switch in alternative positions, fig. 5 a transverse section of the switch body, and fig. 6 a sectional elevation of the heating coil.

1 is a gas burner supplied with gas by a bracket pipe 2. The gas supply is controlled by a valve (not shown) located in the upper portion 3 of the burner, and the valve is adapted to be opened in any known manner by a pneumatic impulse transmitted through a pipe 4 from a pneumatic switch 5 having a switch lever or arm 6.

Fast with the switch lever or arm 6 is an arm 7 secured to a rod 8 carrying a rod 9. The rod 9 is squared to receive a switch body 10 formed of insulating material and divided into two compartments 11, 12 by a dividing wall 13 having bores 14 of small diameter; the compartment 11 being of greater capacity than the compartment 12. The compartments are partially filled with mercury indicated at 16, and leading to the interior of the compartments are terminals 17, 18 connected to circuit with a battery 19 supported in spring clips 20 and with a coil 21 adapted, when the circuit including the battery 19 is closed, to become heated and ignite the gas.

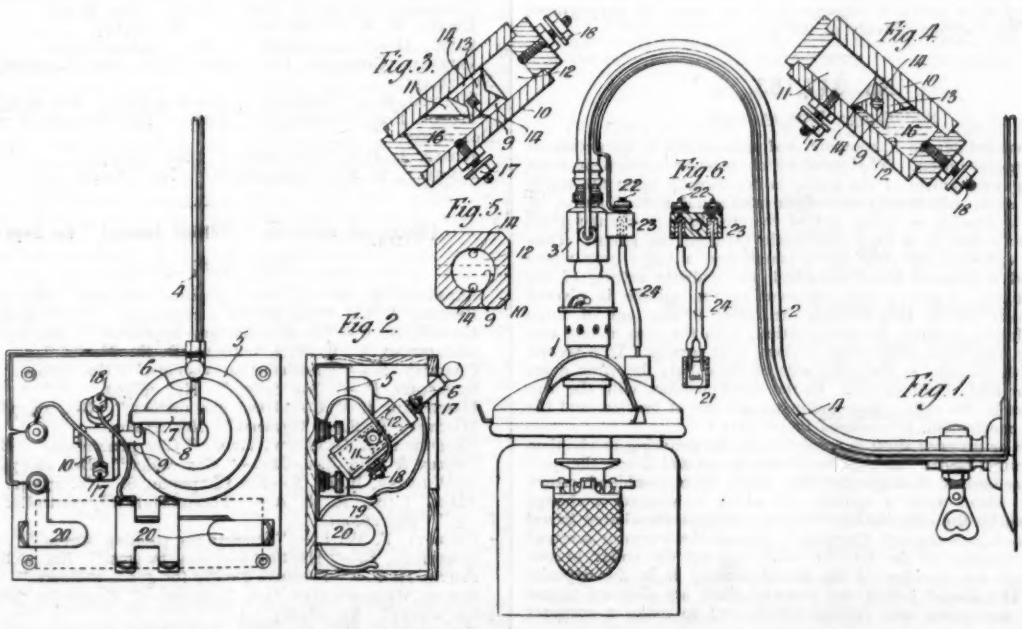
The ends of the leads from the switch and battery are connected to clamping terminals mounted in a block 23 of insulating material and having sockets receiving pins or the ends of leads 24, to whose other ends the coil 21 is connected. The block 23 is secured in position by the screw (not shown) which normally holds the by-pass pipe in position.

In operation, when the switch lever or arm 6 is depressed, the pneumatic switch 5 is operated to open the valve controlling the supply of gas to the burner, and simultaneously the switch body 10 is moved from the position shown in fig. 3 to the position shown in fig. 4.

During the movement of the switch body 10 the mercury contained in the compartment 11 flows through the bores 14 to the compartment 12. When the mercury contacts with both terminals 17, 18, the circuit comprising the battery 19 and coil 21 is completed, and the coil is heated. The mercury maintains contact with both terminals 17, 18 until substantially the whole of the mercury has passed from the compartment 11 to the compartment 12, thereby maintaining the current through the coil for a period sufficient to heat the coil and ignite the gas.

When it is desired to turn out the gas, the switch arm or lever 6 is raised to its normal position, whereby the pneumatic switch allows the valve to be closed. Simultaneously the switch body 10 is moved from the position shown in fig. 4 to the position shown in fig. 3. It will be seen that during this reverse movement of the switch body, the mercury, in flowing from the compartment 12 to the compartment 11, moves out of contact with the terminal 18 very much sooner than it moves out of contact with the terminal 17 when the switch is moved to its "on" position. Thus the circuit is completed when the switch is being moved to its "off" position only for a comparatively short period.

The length of time during which the circuit is completed is regu-



ELECTRIC GAS SWITCH BY THE SOUTH METROPOLITAN GAS COMPANY.

lated by the location of the terminals 17, 18, the size of the bores 14, and the quantity of mercury in the compartments; and obviously the length of time of completion of the circuit can be varied by varying one or more of these factors.

Ridding Coke Oven Gas of Carbon Dioxide. No. 316,174.

UNION CHIMIQUE BELGE SOCIÉTÉ ANYE., of Brussels.

No. 26,593; Sept. 17, 1928. Convention date, July 24, 1928.

Anhydrous ammonia such as is prepared by synthesis from hydrogen drawn from coke oven gas is particularly suitable for saturating all the acid elements contained in coke oven gas. The ammonium carbonate thus obtained can be used to perform a double exchange with calcium sulphate, and thus to yield ammonium sulphate. The gases to be treated are scrubbed, when they come out of the apparatus for the condensation of tar and of the ammoniacal liquor, with a solution which contains ammonia recovered from the condensate, and which is rendered alkaline by the absorption of anhydrous ammonia. Prior to the scrubbing step, the ammoniacal solution advantageously is caused to absorb the ammonia and the acid gases given off in the distilling columns for treating the ammoniacal liquor coming from the cooling apparatus in which the hot gases are treated. These acid gases containing carbon dioxide supply a further source of ammonium carbonate suitable for sulphatation by gypsum. As the evaporation of anhydrous ammonia is a source of cold, advantage is taken from this fact to extract from the gas, freed from acid and alkaline compounds, the aromatic hydrocarbons of the benzole group.

Coin Mechanism of Prepayment Meters. No. 317,182.

METERS, LTD., of Manchester, and GLOVER, W. T., and MAYLOR, J. A., both of Oldham.

No. 18,404; June 25, 1928.

This invention relates to prepayment mechanisms, and has for its object the provision of an improved coin holder adapted to be used with coins of different values, and improved means for actuating the prepayment mechanism from the coin. The coin holder is formed about a spindle adapted to be turned when a coin is in the holder in order to operate the prepayment mechanism. The coin, when inserted into the holder, rests upon a block which is held between side plates to which it is connected by pins and inclined slots; the side plates being attached to, or forming part of, an end plate of the coin holder which can, when a stud is released, be moved along the operating spindle. Such movement causes the block to be moved away from, or towards, the spindle. With this arrangement, if a small coin is to be used, the movable end plate is adjusted towards the front plate of the coin holder to suit the diameter of the coin, and simultaneously the bottom of the holder is raised so that the coin is always held at a correct height for operating the prepayment mechanism.

The coin holder carries a wide pinion which is adapted to engage a change wheel coupled to the prepayment mechanism. This pinion, due to its axial width, can engage the wheel whether the coin holder is adjusted to suit large or small coins. The spindle of the pinion which comes within the coin holder has secured thereto a part with clutch-like teeth thereon; the teeth being curved on one side. The coin in the holder engages the teeth through a gap between two lugs which come over the toothed part. When a coin is placed in the holder, it passes between the lugs and engages the clutch teeth, which prevent the clutch and the wide pinion from rotating. If the coin holder be now turned, the wide pinion will turn the change wheel with which it engages so as to reset the prepayment mechanism for another delivery of the gas.

No. 317,183.

No. 18,405; June 25, 1928.

This patent relates to a compact and economical construction of the foregoing invention. The claw which receives movement from the metering mechanism of the meter is not directly upon the worm or screwed shaft which extends within the usual slotted sleeve or barrel, but is capable of being geared thereto through change gears giving either a low or a high gear ratio between the parts. Thus the spindle carrying the claw has a small and a large gear wheel thereon, and a grooved collar by which the endwise setting of the spindle is fixed. Upon a part adjacent to the spindle is pivoted an arm which can be locked with the collar in any one of three positions relative thereto. In one position, with the arm at one side of the collar, one gear, either high or low, is in service. In a second position, with the arm at the other side of the collar, the other gear, either low or high, is in service. In the third position, with the arm in the groove in the collar, both the gears are out of service, and the prepayment mechanism is rendered inoperative.

The worm or screwed shaft is rotated from the metering mechanism and the slotted sleeve or barrel around is rotated from the prepayment mechanism through the face teeth of a combined crown and ratchet wheel upon a spindle, to which is secured a change wheel rotated by the coin holder. A collar around the slotted barrel has lugs which pass through the slots to engage the worm or screwed shaft; the rotation of the screwed shaft moving the collar in one direction, and the rotation of the barrel moving it in the opposite direction. The slotted barrel and screwed shaft are disposed across the face of the crown and ratchet wheel, and so make a compact construction.

Gas Washer-Scrubbers.—No. 317,412.

CLAPHAM, T. A., of Keighley.

No. 10,450; April 10, 1928.

This invention consists of a series of chambers or enclosed spaces one superposed on another in order to occupy positions around a central revolving shaft. Each chamber is separated from the chamber above by an appropriately formed dish or concave base-piece which will receive the washing liquid. The space between each of these partitions is filled with trelliswork of laths, over which the flowing liquid may travel in order that, as the gas ascends through the chamber, it will impinge upon the moistened surfaces. The shaft is arranged to carry cylindrical members within which volute attachments are mounted to produce a centrifugal pump; and each of these cylindrical members has its lower end dipping into a cavity formed by the partition at the base of each chamber above, while the upper end of the cylindrical member is covered so as to leave an annular space between the upper rod and the cover. The space is formed between a radial flange on the upper end of its cylindrical member and the cover mounted thereon. Thus, as the shaft revolves, so the liquid is thrown out radially through the flat orifice, which is of annular shape extending around the whole periphery of the radial flange on the upper end of the cylindrical member. The liquid is thrown in a sheet over the top of the contents of the chamber in order that it may descend over them to the base, whence it is again pumped to the top.

Externally-Heated Gas Ovens.—No. 317,536.

MEEKCOM, C., of Bayswater, W. 2.

No. 14,102; March 14, 1929.

This invention consists of a gas cooking stove, comprising an oven surrounded by an outer casing so arranged as to provide a space on all sides thereof with the exception of the front; having provided gas burners oppositely disposed in the side flues, and wherein the burners are so constructed as to direct the flames in a substantially horizontal direction beneath the oven, and also in a vertical direction up the side flues, whereby the body of the oven may be evenly heated.

Cement Gun.—No. 317,595.

WOODALL-DUCKHAM (1920), LTD., and DUCKHAM, Sir A. McD., both of Victoria Street, S.W. 1.

No. 19,519; July 5, 1928.

By this invention the cement is impelled into the crack or crevice by means of an explosive. For this purpose a gun is provided which can be loaded with cement of suitable consistency, which is then discharged by firing an explosive so as to discharge the cement into the crack. The patentees find that quite a small explosive charge contained in a cap such as is used for firing a small pistol frequently suffices to impel the cement into the crack. The gun may be of the revolver type, so that a number of discharges may be made without recharging the gun. The barrel of the gun may be constructed so as to distribute the discharge.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 4.]

Nos. 25,863—26,566.

COCKSEDGE, H. E.—"Coking coal." No. 26,435.
EWART, W. E.—"Gas engine." No. 26,164.
GUHL, H.—"Gas burners." Nos. 26,214, 26,500.
IMPERIAL CHEMICAL INDUSTRIES, LTD.—See Cocksedge, H. E. No. 26,435.
MALVOS, R.—"Detection of gas leakages." No. 26,553.
MOTOR FUEL PROPRIETARY, LTD.—"Manufacture of water gas." No. 25,927.
NOBLE, J. H.—"Gas retorts." No. 26,503.
SARGANT, B. S.—"Gas stoves." No. 26,018.

[Extracted from the "Official Journal" for Sept. 11.]

Nos. 26,567—27,294.

ANDREWS, R. S.—"Producing pitch from tar." No. 26,644.
BECKER, A. C.—"Gas-pressure regulators." No. 26,905.
BECKER, A. C.—"Adjustable gas appliance." No. 27,019.
BROADHEAD, C. F.—See Andrews, R. S. No. 26,644.
CHAPMAN, S.—"Gas-detection systems." No. 27,040.
EBERSOLD, P.—"Gas boiler." No. 26,597.
HANSFORD, J.—"Coin-freed gas meters." No. 27,178.
HARTLEY, T. E.—"Geysers." No. 27,202.
HUMPHREYS & GLASGOW, LTD.—"Gas generators." No. 27,134.
JUNKER & RUH AKT.-GES.—"Gas cocks." No. 26,674.
MCWHIRTER, E. M. S.—See Chapman, S. No. 27,040.
MAIN, LTD., R. & A.—"Thermostatically-controlled valve devices." No. 26,921.
PARROTT, F. W. L.,—"Burners for cooking stoves." No. 26,850.
SCHREIBER, E.—"Heating furnaces by gas." No. 26,851.
SMITH, H. P.—"Pressure gauges for gas containers." No. 26,783.
SOUTH METROPOLITAN GAS COMPANY.—"Expansion joints in fire-brick work." No. 26,804.
WORTLEY, G. W.—See Main, Ltd., R. & A. No. 26,921.

MISCELLANEOUS NEWS.

YEAR'S WORKING AT STOCKPORT.

First Report of Mr. Sowerbutts.

In his first annual report on the activities of the Stockport Gas Department for the financial year ended March 31 last, Mr. Walter S. Sowerbutts, the Engineer and Manager, who was appointed to succeed the late Mr. Meunier in December last year, states that the total income on revenue account is £235,458, as compared with £247,609 for the previous year. The reduction is entirely due to less revenue from residuals, this source of income showing a reduction of £13,166. Sulphate of ammonia, however, showed an improvement of £797, due to a slightly harder market, and also to a continued improvement in the working of the plant.

Expenditure on revenue account has been £175,264, as compared with £185,534 in 1927-28, being a reduction of £10,270, the chief item of which is a decrease of £9000 in manufacturing costs. A saving on maintenance of works (£1914) and chemical plant (£1049) has been achieved, whereas £687 increased expenditure has been incurred in repairs and maintenance of mains and services, due to the very severe weather experienced in February.

A new high-pressure main to Bramhall has been in use throughout the year, and, together with the attention paid to leakage and renewals of old mains, has contributed to the reduction of the gas unaccounted-for figure to 4·5 p.ct. The expenditure on capital account was £27,885, of which the chief item was £19,206 on account of the new purifying plant, which was put into commission in November last, and the results obtained from which have been very satisfactory.

GAS AND UNSOUGHT PUBLICITY.

A Matter of Ignorance.

In an address before the Chester-le-Street Rotary Club, Mr. L. H. Sensicle, B.Sc., F.I.C., of the Newcastle-upon-Tyne and Gateshead Gas Company, said that, apart from the industry's own advertising, gas receives a fair amount of unsought publicity of an unfortunately distasteful kind. The first type of notoriety arises from the occurrence from time to time of suicide by means of gas. There is a tendency to decry gas for the ease with which it can be used for that purpose; but it can be almost unanswerably argued that, if gas were not available, people intent on taking their lives would find other means of doing so.

A further notoriety results from occasional explosions, and from underground leaks in recent times. Gas in itself is not explosive in the sense that gunpowder or T.N.T. are ; in other words, it is the mixture of gas with air that is explosive. The explosion is, in essence, a flame which spreads rapidly throughout the mixture. The rapidity of the flame movement depends upon the proportions of air and gas in the mixture, and in the most favourable mixture combustion is so rapid that a violent explosion results. There are limits in the concentration of gas beyond which ignition will not take place when a spark or light is applied. For an average town gas the lower limit of gas in air is 7 p.ct. and the upper limit 21 p.ct. Somewhere between these limits in the midway region occurs the mixture of greatest explosive action. The richer the gas, the lower is the percentage of it required to make air explosive. Thus benzene vapour has a low limit of 2·7 p.ct., while its mixtures with air are inflammable up to 52 p.ct.

There are combustible gases other than those obtained from the gas-works, and some of them are to be found occasionally in potentially dangerous places. In this class are sewer gas, petrol and benzole vapour, acetylene, turpentine vapour, and the emanation from newly painted surfaces, coal store gas, and, last but not least, bitumen gas. The last-named is a very rich gas, and it therefore takes very little mixed with air to form an explosive mixture. Bitumen gas is formed in great quantity when bitumen is overheated. Bitumen is a common insulating material for electric cables, and cases have occurred when the cable has been heated by overload or short-circuiting; and this gas, which is accompanied by black smoke, has been evolved. Unfortunately the circumstances are very favourable for explosion, since the gas is first evolved, and the temperature does not rise to ignition point until later, when gas has mixed with the air above; alternatively, sparking does not occur until some of the bitumen has left the cable and so reduced its insulation.

The gas industry, continued Mr. Sensicle, has sometimes had a bad Press where accidents have occurred. If gas, no matter of what origin, is thought to have been smelt, it is immediately believed by Press and public to have been town gas. The first day's reports of a calamity are well placarded and headlined. Subsequent results of investigation revealing perhaps another than the first suspected cause are reported in small inconspicuous paragraphs on a later date when interest has naturally subsided. If there are two outstanding points which it seems ought to be more generally appreciated, they are, first, that gas by itself—*i.e.*, without air—cannot explode, no matter how much heat or how many sparks are applied to it; and, secondly, that the gas from the gas-works is not the only kind which can be found in the wrong places.

It is for the good of the community that there should be competition between gas and electricity. There is, and always will be, room for both. Man started with solid fuel, and this served his purpose for countless generations; and then came liquid fuel, and finally gaseous fuel. The advent of each new arrival might be thought to have threatened the earlier form, yet all three states of fuel have their field to-day, and the earliest—*i.e.*, solid fuel—is still the most popular. Electricity can almost with scientific truth be said to be the fourth state of matter in that it represents the finest state of subdivision into which we can conceive matter to be taken. The less rarified condition or third state of matter—namely, gas—now appears to be threatened by the advent of electricity; but, arguing by analogy, it is far less likely that electricity should banish gas than that gas should entirely eliminate solid and liquid fuel.

Further, it can be said that gas has passed over a century of progress, and is thus sufficiently developed in efficiency of manufacture to be within reach of the poor man's purse. The progress has not ceased; in fact, it may be said to be accelerated. Chairs in gas engineering have been established in universities here and in America; and constant research is being carried on. Gas passed its childhood in the Victorian era, and for that reason has perhaps been unconsciously thought of as possessing a kind of decaying respectability associated with that remarkable period. But it should be remembered that the troubles of childhood have been successfully surmounted, and the young man, having put away childish things in this present century, is making great progress and is always looking for fresh fields to conquer.

GAS UNDERTAKINGS ACT APPLICATIONS.

DECLARATIONS OF CALORIFIC VALUE.

Ackworth, Featherstone, Purston, and Shariston Gas Company.—450 B.Th.U. per c.ft. (Jan. 1, 1930).

Connah's Quay Gas and Water Company, Ltd.—475 B.Th.U. (Jan. 1, 1930).

Glossop Gas Company.—450 B.Th.U. (Jan. 1, 1930).

Marlborough Gas Company.—475 B.Th.U. per c.ft. (Jan. 1, 1930).

GAS REGULATION ACT.

Portishead Gas Company, Ltd.—500 B.Th.U. per c.ft. (Dec. 27).

GAS UNDERTAKINGS ACT ORDERS.

SECTION 6.

East Ardsley Gas Company.

The Company shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Haworth Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Heywood Corporation.

The Corporation shall from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Kirkham Gas Company, Ltd.

The Company shall, from Jan. 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Oct. 1 give notice of the calorific value of the gas they intend to supply.

Longridge Gas Company.

The Company shall, from Jan. 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Oct 1, 1929, give notice of the calorific value of the gas they intend to supply.

Spennymoor and Tudhoe Gas Company.

The Company shall, from Jan. 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Oct. 1 give notice of the calorific value of the gas they intend to supply.

Whitby Gas Company.

The Company shall, from Jan. 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Oct. 1 give notice of the calorific value of the gas they intend to supply.

Worsboroughdale and Worsborough Gas Light and Coke Company, Ltd.

The Company shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

EXTENSION AT BELFAST GAS-WORKS.

Glover-West Vertical Retorts.

A decision has been taken to extend the carbonizing plant at the Belfast Gas-Works to cope with steadily growing demands and to safeguard the position for the future. This is really an expansion of a scheme the first stage of which was completed over two years ago—the reconstruction of "D" bench of vertical retorts and the installation of waste-heat boilers, which was carried out by Messrs. West's Gas Improvement Company, of Manchester. It has now been decided to reconstruct the existing "C" bench of Glover-West vertical retorts in a similar way.

Among other outstanding advantages, the following are claimed: (1) The capacity of "C" bench would be increased from 2,750,000 c.ft. to 5 million c.ft. per day; (2) the increased output would be obtained upon the same ground area as is at present utilized, and the space held in reserve for future extension would not be encroached upon; (3) increased yields of gas, tar, and ammonia per ton of coal would be obtained; (4) the existing retort house, retort bench bracing, and auxiliary machinery could be utilized; (5) the capital cost per million c.ft. of increased capacity would be low; (6) the reconstruction could be carried out during the spring and summer months without interfering with normal operations, and the plant would be ready to meet the winter demand of 1930-31.

The general reconstruction will follow the lines of the previous one, and an opportunity will be taken to reconstruct several portions of the plant which are common to both "C" and "D" benches.

GAS EXHIBITION AT BAKEWELL

Opened by the Marquis of Hartington.

Opening a five days' gas exhibition at the Bakewell Town Hall on Tuesday, Sept. 10, the MARQUIS OF HARTINGTON, last year's President of the Society of British Gas Industries, said that gas was still, he believed, far and away the most economical method of heating and cooking. The gas industry was having to meet keen competition from electricity. Electricity was forging ahead rapidly; and in this country, where the source of both gas and electricity was still coal—and must be coal—and where it was questionable whether we should be able to produce much electricity by water power, there was very little doubt that for many years to come gas would remain cheaper and more efficient than, and quite as clean a source of heat for cooking and domestic purposes as, electricity. The outlook for gas was as bright as it had ever been, and there were great possibilities of the extension of its use. Great strides had been made lately in the use of the gas lighter for the ordinary domestic fire. It was cheaper than sticks, and by securing immediate combustion, it meant that less smoke was given off.

Mr. PHILIP WOOD (Chairman of the Bakewell Gas Committee), who presided, said that it was twenty years since a similar exhibition was held at Bakewell. The Council had hired out cookers to consumers at 2s. 6d. per quarter, but they thought that the standard type of cooker did not necessarily meet the needs of everybody; and the exhibition was held to bring before the public better types of cookers. These could be purchased on a cash basis or on hire-purchase terms.

The lecturer was Miss H. H. Tuxford.

CANADIAN GAS AND COKE INDUSTRY.

Statistics for 1928.

[Extracted from the Board of Trade Journal.]

The manufacture of coke and gas in Canada in 1928 was carried on in 45 plants, capitalized at 92,145,190 dollars, employing 3914 persons and turning out products with a total value of 34,708,447 dollars, states a report received by the High Commissioner of Canada in London from the Dominion Bureau of Statistics at Ottawa. Materials cost 17,164,246 dollars, so that the value added by manufacturing processes was 17,544,201 dollars.

Illuminating and fuel gas was the principal product of 37 plants, and 8 plants were engaged principally in the manufacture of coke. Output of gas coke and bye-product coke in Canada during 1928 totalled 2,314,127 tons, an increase of 287,689 tons over the total for the previous year. This tonnage established a new record, being 14 p.ct. greater than the previous high record of 2,027,058 tons in 1926. Bye-product coke plants produced 1,980,591 tons in 1928, while only 333,536 tons were obtained from artificial gas plants. In addition, 95,908 tons of petroleum coke were recovered as a bye-product of petroleum refining.

Production of gas totalled 35,058,920 thousand c.ft., of which 11,867,124 thousand c.ft. were produced in gas plants and 23,191,796 thousand c.ft. in bye-product coke ovens. Sales of gas reached 15,606,609 thousand c.ft., worth 13,933,537 dollars; most of the remaining gas was used for fuel in the retorting plants or associated metallurgical works. A further 2,489,346 thousand c.ft. of still gas was made in petroleum refineries for their own use.

Imports of coke into the Dominion increased to a total of 1,060,029 tons in 1928 from 772,235 tons in 1927. Exports of bye-product and gas coke totalled 25,058 tons, as compared with the 1927 figure of 74,109 tons. In addition, petroleum coke amounting to 19,857 tons was exported during 1928, as against 17,424 tons in 1927.

TRADE NOTES.

Tully Plant at Lochgilphead.

The Lochgilphead Gas Company have recently installed a small Tully plant, and have changed from straight coal gas to all "Tully Gas" without experiencing any trouble or complaints from the consumers.

Tully Mechanical Water Gas Operator.

Messrs. Tully, Sons, & Co., Ltd., of Newark-on-Trent, have received an order for one of their patent water gas mechanical operators from the Glass Works, Montier, Switzerland, who have one of the many Tully gas plants in use for the manufacture of industrial gas on the Continent.

Aluminium Paint and Factory Lighting.

Without any increase of glass areas or changes in their arrangement, added intensity of light sources, or re-arrangement of lighting fixtures, better natural illumination of one of the large foundry buildings of the General Electric Company of Erie, Pa., has been secured through the use of aluminium paint. Only one coat, which was considered the equivalent of two coats of oil paint, was used; and this was sprayed on. The cost of application was 48 p.ct. of that of an equivalent pigmented surface, and, since re-finishing will have to be done at less frequent intervals, further savings are possible through reduced painting costs and avoidance of interference with production work. An added advantage of the aluminium paint is that it is highly resistant to lacquer fumes that are released in the shop.

Asbestos Cement Building Products, Ltd.

Owing to the rapidly increasing business of the asbestos cement units of the Turner & Newall, Ltd., group, a new Sales Company, styled Asbestos Cement Building Products, Ltd., has been established to include in its scope the entire sales activities of Turner Brothers Asbestos Company, Ltd., at Trafford Park, Manchester (for asbestos-cement products), Bell's Poilite and Everite Company, Ltd., London, and British Fibrocement Works, Ltd., Erith, so that, as from Oct. 1, the sale of all asbestos-cement building products (including "Turners' Trafford Tiles," Bell's "Bigsix," "Poilite," "Fibrent," "Turnall," "Serval," and "Everite" asbestos-cement goods, "Decolite" floorings, rigid rubber-floor tiles, and decorated products, &c.) will be conducted in the name of Asbestos Cement Building Products, Ltd. The new Company will have its Headquarters at Trafford Park, Manchester, with Branch Offices in London: Queen's House, Kingsway, W.C.2; Birmingham: 14, New Street; Newcastle-on-Tyne: Collingwood Buildings; and Glasgow: Castle Chambers, 65, Renfield Street. In addition, a mobile, technically-trained staff of representatives will cover the whole of the country to give advice and assistance upon all problems connected with the roofing, walling, panelling, and flooring of all types of buildings.

CURRENT SALES OF GAS PRODUCTS.

LONDON, *Sept.* 16.

There are no changes to report in the tar products market, and prices remain unaltered.

Tar Products in the Provinces.

Sept. 16.

Markets for tar products are steady.

Pitch is still very firm. There is a good demand, and a fair amount of business has been transacted on the basis of 47s. 6d. f.o.b. There are still inquiries for the second half of next year, and some business is said to have been done on the basis of 45s. f.o.b.

In creosote, there is no alteration in the market.

Crude carbolic is in keen demand, and consumers are anxious to purchase right to June next year.

Crystals carbolic are very firm indeed for near delivery. For delivery to the end of the year 9¾d. is asked; but it is possible to buy synthetic crystals in America for next year's delivery at considerably under this figure.

For pure naphthalene business continues at fair prices. The market for whizzed naphthalene is steady.

Water-white products are firm generally; but there is not such a good demand for pure products, and prices have eased a little.

The average prices of gas-works products during the week were: Gas-works tar, 25s. to 30s. Pitch—East Coast, 47s. 6d. f.o.b. West Coast—(f.a.s.) Manchester, 42s. to 42s. 6d.; Liverpool, 45s. 6d. to 46s. 6d.; Clyde, 45s. 6d. to 46s. 6d. Toluole, naked, North, 1s. 7½d. to 1s. 8¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid and salty, 3¼d. to 3½d.; low gravity, 2d. to 2¼d.; Scotland, 3¼d. to 3½d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 2s. 5d. to 2s. 6d. prompt. Naphthalene, £12 to £14. Salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.		s. d.		
Crude benzole . . .	0 10	to	0 11	per gallon at works	
Motor ,, . . .	1 5	,,	1 6	,,	,,
90 p.ct. ,, . . .	1 7	,,	1 8	,,	,,
Pure ,, . . .	1 10	,,	1 11	,,	,,

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Sept. 13.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Aug. 15	5	5	Aldershot 5 p.c. max. C.	70—75	..	74
412,992	,,	,,	4	4	Do. 4 p.c. Pref.	73—76	..	..
1,581,888	,,	Apl. 11	7½	7½	Alliance & Dublin Ord.	96—99	..	94—98
374,000	,,	July 11	4	4	Do. 4 p.c. Deb.	62—66	..	..
523,655	,,	Aug. 29	7	7	Barnet Ord. 7 p.c.	112—115	..	113½
800,000	1	May 9	1/4½	1/4½	Bombay, Ltd.	17/6—20/-	—9d.	17/6
172,500	10	Aug. 29	8½	9	Bournemouth 5 p.c.	12½—13½	..	..
800,050	10	,,	7	7	Do. B 7 p.c.	12½—13½	..	..
439,160	10	,,	6	6	Do. Pref. 6 p.c.	10½—11	..	..
80,000	Stk.	July 11	3	3	Do. 3 p.c. Deb.	54—57	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	72—75	..	..
857,900	,,	Aug. 29	7½	7½	Brighton & Hove 6 p.c. Con.	113—116	..	..
371,880	,,	,,	6½	6½	Do. 5 p.c. Con.	100—103	..	..
1,387,500	,,	July 25	6	6	Bristol 5 p.c. max.	88½—91a	..	..
885,000	,,	Sept. 12	7½	7	British Ord.	115—118*	—2	118
100,000	,,	June 27	7	7	Do. 7 p.c. Pref.	112—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	71—74	..	73
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	94—97	..	..
100,000	10	May 30	6	6	Cape Town, Ltd.	9—10	..	..
100,000	10	Apl. 24	4½	4½	Do. 4½ p.c. Pref.	6½—7½	..	..
150,000	Stk.	June 27	4½	4½	Do. 4½ p.c. Deb.	71—76	..	..
486,850	,,	July 25	6	6	Cardiff Con. Ord.	98—101	..	..
227,850	,,	June 27	7½	7½	Do. 7½ p.c. Red. Deb.	99—102	..	..
187,150	,,	Aug. 15	6½	5	Chester 5 p.c. Ord.	86—91½	..	..
98,986	1	May 9	12/-	12/-	Colombo Ltd. Ord.	35/—37/-	..	..
24,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	20/—22/-	..	..
875,402	1	Apl. 11	1/03	1/03	Colonial Gas Assn. Ld. Ord.	24/6—26/6	..	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/6—22/6	..	..
9,073,280	Stk.	July 25	7	5	Commercial Ord.	93—96	..	94½—95
475,000	,,	June 13	8	8	Do. 8 p.c. Deb.	56—59	..	..
787,560	,,	Aug. 15	7	7	Croydon sliding scale	108—111	..	..
403,100	,,	,,	5	5	Do. max. div.	81—84	..	..
542,270	,,	Aug. 29	10	7	Derby Con.	118—121e	..	..
55,000	,,	June 27	4	4	Do. Deb.	68—71e	..	..
289,000	,,	Aug. 29	5	5	East Hull Ord. 5 p.c.	73—75	..	..
1,009,180	10	Sept. 12	†7	†4	European, Ltd.	16—18*	—½	16—17½
18,708,480	Stk.	July 25	8½	8½	Gas Light & Coke 4 p.c. Ord.	17/9—18/3/	—3d.	17/10½—18/3
2,600,000	,,	,,	8½	8½	Do. 8½ p.c. max.	61—63	..	61½—62½
4,187,030	,,	,,	4	4	Do. 4 p.c. Con. Pref.	73—75	..	73—74½
5,600,000	,,	June 13	3	3	Do. 3 p.c. Con. Deb.	53—59	—½	56—57½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	97—100	..	99½
83,600	,,	Aug. 29	7	7	Hastings & St L. 5 p.c. Conv	98—103	..	..
359,740	,,	,,	5½	5½	Do. 5½ p.c. Conv.	77—82	..	..
70,000	10	Apl. 24	†10	†10	Hongkong & China, Ltd.	14—15	..	..
219,200	Stk.	Aug. 29	6	6½	Hornsey Con. 5½ p.c.	84—87	..	..
1,976,000	,,	May 30	10	20	Imperial Continental Gas	420—440	—2½	424—445
229,180	,,	Aug. 15	3½	3½	Do. 3½ p.c. Red. Deb.	69—72	..	..
285,242	,,	Aug. 15	7½	8	Lea Bridge 5 p.c. Ord.	115—118	..	..
2,145,907	,,	Aug. 15	6½	6	Liverpool 5 p.c. Ord.	93—94b	..	..
600,000	,,	Mar. 21	7	7	Do. 7 p.c. Red. Pref.	102—104b	..	..
165,786	,,	Aug. 29	8	9	Maidstone 5 p.c. Cap.	122—127	..	..
63,480	,,	June 27	3	3	Do. 3 p.c. Deb.	53—56	..	..
75,000	5	June 13	‡8	‡10	Malta & Mediterranean Metrop't'n (of Melbourne)	5½—6	..	..
392,000	—	Apl. 2	—	5½	5½ p.c. Red. Deb.	100—102	..	..
541,920	Stk.	May 30	‡5	‡9	Montevideo, Ltd.	105—108	..	..
2,051,818	,,	July 25	5½	5	Newcastle & Gateshead Con.	17/—17/6d/	+3d.	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref.	71½—72½d	+1	..
621,705	,,	June 27	8½	8½	Do. 8½ p.c. Deb.	68—69d	..	..
121,780	,,	Aug. 29	7/1/0	7½	North Middlesex 6 p.c. Con.	110—115	..	..
300,000	,,	Apl. 24	9	7	Oriental, Ltd.	115—120	..	116½—117
205,162	,,	June 27	8	8	Plym'th & Ston'house 5 p.c.	110—113	..	..
424,416	,,	Aug. 29	8½	8	Portsm'th Con. Stk. 4p.c. Std.	113—118	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max.	80—83	..	..
2,884,464	1	June 27	—	‡5	Primitiva Ord.	24/—26/-	—1/-	24/3—25/3
244,500	100	June 8	4	4	Do. 4 p.c. Red. Deb.	92—95	..	..
595,000	Stk.	July 25	4	4	Do. 4 p.c. Red. Deb. 1911	79—82	..	82
416,845	,,	June 27	4	4	Do. 4 p.c. Cons. Deb.	79—82	..	81½—83
150,000	10	Mar. 21	6	6	San Paulo 6 p.c. Pref.	8½—9	..	..
1,736,968	Stk.	Mar. 21	6½	6½	Sheffield Cons.	108—110a	..	..
95,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb.	74—77a	..	..
90,000	10	June 13	‡4	‡4	South African	4—6	..	..
6,609,995	Stk.	July 26	7½	5	South Met. Ord.	100—102	—1	100½—102
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	106—109	+1	106½
1,895,445	,,	July 11	3	3	Do. 3 p.c. Deb.	57—60	..	58
784,000	,,	Sept. 12	6½	6½	Do. 6½ p.c. Red. Db.	98—100*	—2	98½
91,500	,,	Aug. 15	8½	8½	South Shields Con.	103—104d	..	..
1,543,795	,,	July 26	6½	6½	South Suburban Ord. 5 p.c.	103—106	..	104—105
462,837	,,	June 27	5	5	Do. 5 p.c. Deb.	95—98	..	..
647,740	,,	Aug. 15	5	5	South'mpton Ord. 5 p.c. max.	77—80	+1	..
181,275	,,	June 27	4	4	Do. 4 p.c. Deb.	70—73	..	..
179,014	,,	July 25	8	8	Sutton Ord.	116—119	+1	118—118½
67,828	,,	June 27	—	5	Do. 5 p.c. Deb.	90—93	+1	98
360,600	,,	Feb. 21	7	7	Swansea 7 p.c. Red. Pref.	100—102	..	..
300,000	,,	June 27	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
1,002,275	,,	Aug. 15	6½	6½	Tottenham District Ord.	105—108	..	106
150,000	,,	,,	6½	6½	Do. 5½ p.c. Pref.	97—100	..	..
181,955	,,	June 13	4	4	Do. 4 p.c. Deb.	74—77	..	..
339,094	* ,,	Aug. 29	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	98—98	..	96—97
82,930	,,	,,	5	5	Do. 5 p.c. pref.	85—90	..	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	..	July 11	9	9	Wandsworth A 5 p.c.	144—147	..	..
855,536	,,	,,	7½	7½	Do. B 5½ p.c.	122—127	..	..
432,536	,,	,,	6½	6½	Do. C and New	100—105	..	..
852,000	,,	,,	7½	7½	Do. Wimbledon 5 p.c.	112—117	..	..
98,000	,,	,,	7½	7½	Do. Epsom 5 p.c.	123—128	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref	87—92	..	..
88,416	,,	June 27	3	3	Do. 3 p.c. Deb.	54—57	..	..
284,742	,,	,,	4	4	Do. 4 p.c. Deb.	74—77	..	..
207,060	,,	,,	5	5	Do. 5 p.c. Deb.	93—96	..	..

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle. e.—Sheffield. f.—The quotation is per £1 of Stock. * Ex. div. † Paid free of income-tax. ‡ For year.

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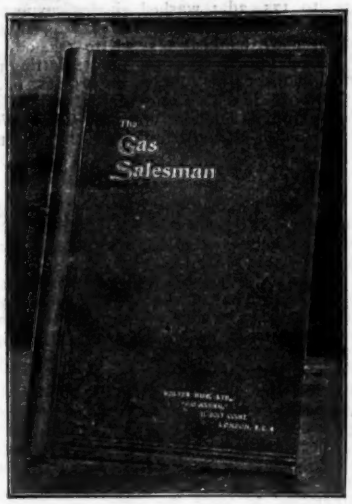

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COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The market during the past week has been extremely quiet, especially as regards Durham coals. There has been a continued scarcity of boats, so serious as to lead to railway wagon difficulties. Some of the collieries have had idle time—a rare experience in recent months—and there are, of course, a good many weak spots in consequence. All this is very disappointing to producers, but it is felt in some quarters that it cannot be all attributed to the shortage of boats, and that there has been a decided falling off in the spot demand. As usual, the prompt position is affecting the tone of forward business, and, while collieries are still as firm as ever in their ideas for next year, buyers are showing hesitation. The discussions on selling schemes, and the general hints of the possibility of renewed labour troubles and political interference, are very disturbing influences.

Current quotations for gas coals are 17s. 6d. f.o.b. for Wear Specials, and 16s. 6d. to 17s. for best qualities. These better brands are fairly firm, but seconds are easy at 15s. to 15s. 6d. Coking coals, while nominally 15s. 6d. to 16s., are an uncertain market. Best Durham bunkers are quoted at 16s. to 16s. 6d., and seconds are freely offered at 15s. Northumberland steams on the whole are steady, and 16s. is quoted firmly for best screened sorts.

Gas coke is steady at 21s. 6d. to 22s. f.o.b. for shipment.

YORKSHIRE AND LANCASHIRE.

The export trade continues firm, with an increased inquiry for best hards, quotations for which are 18s. per ton f.o.b. Delivery is not so good in secondary sorts, though a large quantity continues on offer. There is an increasing demand for gas coal. Furnace coke is in fairly good request, with prices of 22s. to 23s. per ton f.o.b. The home request for industrial fuel remains good, and the export inquiry fair, with prices of washed trebles 18s., doubles 17s. 6d., singles 16s. 6d., smalls 15s. 6d., per ton f.o.b.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports.

South Yorkshire.—Hards, Association, bunkers 18s. 9d. to 19s., export 18s.; screened gas coal, export 18s.; washed trebles, export 18s.; washed doubles, bunkers, 18s. 9d., export 17s. 6d.; washed singles, export 16s. 6d.; washed smalls, bunkers 16s. 3d., export 15s. 6d.; rough slack, bunkers 13s. 6d. to 13s. 9d., export 12s. 6d. to 13s.; smithy peas, export 19s. to 19s. 6d.

West Yorkshire.—Hartley's (f.o.b. Goole), bunkers 17s. 6d., export 17s. to 17s. 6d.; screened gas coal, export 18s. to 18s. 6d.; washed trebles, export 17s. 6d. to 18s.; washed doubles, export 16s. 9d.; washed singles, export 16s.; washed smalls, bunkers 15s. 3d., export 14s. 6d.; unwashed trebles, export 17s. to 17s. 6d.; unwashed doubles, export 15s. 6d.; rough slack, bunkers 13s. 6d., export 12s.; coking smalls, export 12s.

Derbyshire and Nottinghamshire.—Top hards, bunkers 18s. 6d. to 19s. 3d., export 17s. 6d. to 18s. 3d.; cobbles, bunkers 18s. 9d., export 17s. 6d.; washed trebles, export 18s.; washed doubles, export 17s. to 17s. 3d.; washed singles, export 16s. to 16s. 6d.; washed smalls, bunkers 16s., export 14s. 6d.; unwashed doubles, export 16s.; rough slack, bunkers 14s. 3d. to 14s. 9d., export 12s. 6d.

Yorkshire, Derbyshire, and Nottinghamshire.—Screened steam coal, bunkers 17s. to 18s., export 16s. 6d. to 17s.; gas coke, export 23s. to 24s.; furnace coke, export 23s. to 24s.; washed steam (Goole, West Yorks.), bunkers 17s. 9d.; (Hull, West Yorks.), bunkers 18s.; (Hull, South Yorks.), bunkers, 18s., export 17s.

MIDLANDS.

The market continues inert. Warnings of further advances to come have little effect in stimulating buying. There is a little more doing in industrial coals, not more, however, than is accounted for by seasonable influences.

The weather has been all against the development of fresh activity in the house coal market. Merchants have put down heavier stocks than last year in view of the probable effect on prices of the stricter control towards which the trade is moving, and the prospect of a readjustment of labour conditions. Consumers are buying very little. Those who have stocking accommodation and believe in making use of it have had no occasion to draw upon reserves laid in at minimum summer prices. Others will not bestir themselves till necessity presses.

There are few spot lots on offer. This is attributed, however, not to equilibrium in supply and demand, but to a market so irresponsive that sales departments think there is nothing to be gained by attempting to force the pace. At collieries which cater principally for the household trade there are large accumulations of slacks waiting to be cleared. Low grades could be bought at 3s. 6d. if anybody wanted them.

Coke prices continue to harden. Blast-furnaces are getting as much as they require, but renewal of contracts is an increasingly anxious business. There are practically no offerings on the open market.

CONTRACTS OPEN.

Coal.

The Clacton Urban District Council invite applications for the supply of gas coal. [See advert. on p. 636.]

It has been decided to reduce the price of gas by 4d. per 1000 c.ft. at Knutsford.

Bolton's Civic Week.—From Sept. 20 till Sept. 29 Bolton will stage a "civic week," and its various municipal activities, naturally including the gas-works, will be open to inspection.

Gas Sales at Ellesmere.—The annual statement of accounts of the Ellesmere gas undertaking was presented at a meeting of the Urban Council on Friday last. The report stated that the gas sold during the year was 7¼ million c.ft., as against 6¼ millions for the previous year. It was also reported that the cost of the new gas-holder was £2214.

Reduction in Gas Price at Brighton.—The Brighton and Hove General Gas Company give notice that, as from the reading of the gas meter indices at the end of the current (Michaelmas) quarter, the price of gas to ordinary consumers will be reduced by 0·2d. per therm, or 1d. per 1000 c.ft. The new price of gas will be 9d. per therm, or 3s. 9d. per 1000 c.ft.

Driffield's Gas Showroom.—At a recent meeting of the Driffield Urban Council, there was a protest, on behalf of local tradesmen, against the new showroom opened by the Gas Committee. Mr. H. J. Taylor contended that it was an interference with the private traders in gas appliances. A motion that after three months no further purchases of fittings should be made was defeated.

Encouraging Gas Usage in Belfast.—Hitherto it has been the practice in Belfast, when application has been made for a supply of gas, to supply free of cost the service pipe laid in the public thoroughfare, but to charge to the applicant the cost of the pipe laid in private property. With a view to furthering the use of gas, this arrangement has now been revised; and on the recommendation of the Manager, Mr. J. D. Smith, service mains on private property will in future be installed free up to a length of 30 ft., the same to apply to renewals.

Public Lighting at Corbridge.—A plea for additional and extended facilities for lighting for Corbridge was put forward at a public meeting at Corbridge to vote the amount to be expended on lighting the village during the winter. Major-General Sir R. A. Kerr Montgomery, Chairman of the Parish Council, presided. Councillor J. L. Dennison drew attention to last year's resolution to extend the lighting; and Mr. Burnip moved, and it was agreed, that certain lamps in the village remain lit all night. He said it was ridiculous that a village of the size of Corbridge should extinguish its lamps at 10.30 each night.

Gasholders in Rural Districts.—Mr. T. Rhys Evans, Chairman of the North Wales (Coastal Area) Regional Planning Committee, speaking at a meeting of the Conway Rural District Council, said he understood that in connection with a gas extension scheme the Colwyn Bay Council proposed to erect gasholders in the rural district. He wished to preserve the amenities of the Llangystenin and Glanwydden valleys, and hoped that even before choosing sites for any such constructions the Colwyn Bay Council would consult the Rural Council. It was decided to ask the Colwyn Bay Council not to proceed in acquiring sites until the Rural Council had been consulted.

Fairy Gas Competition.—The names of the prizewinners in the annual Fairy Gas Competition organized by the British Commercial Gas Association have just been published. The £50 scholarships (awarded for essays on domestic hygiene) have been won by Lilian Beryl Bryan, of Cardiff, and Mary Quinn, of Lockerbie. Cardiff has taken a scholarship once before, but this is the first time that a Lockerbie child has gained a first place. The scholarship money will as usual be held in trust to be spent in assisting the education of the winners. Children all over the British Isles entered for this competition. The address of one competitor was "The Lighthouse, Kirkwall," and it was with real regret that the judges had to decide that his paper was not up to prize standard.

Glasgow's Gas Supply.—At a recent meeting of the Glasgow Corporation, the minutes of the Gas Committee contained a recommendation to enter into an agreement with Messrs. John Gardner (Collieries), Ltd., to supply for fifteen years 20 million c.ft. of gas per day at 8·4d. per 1000 c.ft., or 1·75d. per therm; but it was agreed to take the matter back for further consideration. Mr. J. Strain said they ought to have a full report as to what such a proposal would really mean. Before being asked to vote, they ought to know; for instance, the number of men who would be dismissed if the scheme came into operation, the amount of wages involved, and the reasons why the Gas Department could not enter into the new coal distillation process whereby they would be able to produce gas either by the American or by the British system, and so bring cheaper gas to Glasgow.

Increased Demands for Gas at Sedgley.—The annual report of the gas undertaking of the Sedgley Urban Council for the year ended March 31 last states that the gross profits amounted to £5789, and the net profit to £2555. During the year the price of gas was reduced by 9d. per 1000 c.ft., and at the end of the year—the first time for a long period—the undertaking finished up with a cash balance in hand of £358. In connection with the development of the large Goldthorn Estate, agreement has been reached with the Wolverhampton Gas Company for a supply of gas, in bulk for a period of ten years, as the development had commenced at the Wolverhampton end of the estate, away from the existing mains of the undertaking. Eventually when the development reached Springhead on the Sedgley side, it would be connected up with the general system of distribution. Borrowing powers had been sought for constructing mains on this estate. To meet the increasing demand, a scheme for the general extension of works was under consideration, and as a first instalment it was proposed to erect immediately a water gas plant of a capacity of 150,000 c.ft. per day.

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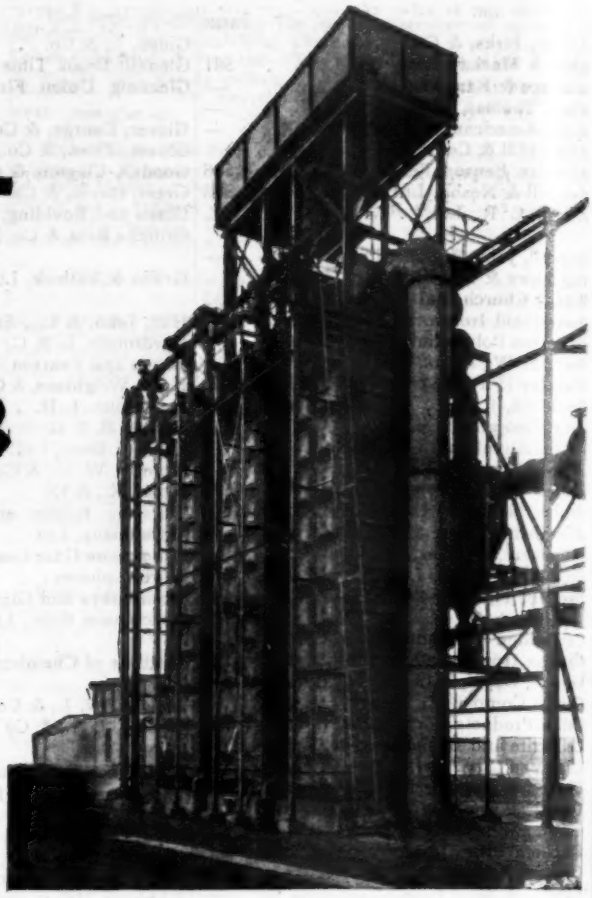

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